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ABSTRACT

This report gives estimates of the intellectual maturity based on the Goodenough-Harris Drawing Test (GHDT). The data were collected in Cycle III of the Health Examination Survey of noninstitutionalized U.S. youths during 1966-70. The GHDT instructions were modified for use in the survey to require each youth to draw two figures--a "person" and a "self" figure. Sexual differences in preferences and performances levels in drawing male and female figures are reported. Three charts present mean raw scores earned by boys and girls at each given age on the drawings of a man and woman. Two of the graphs contain data from the Cycle II examination of children 6-11 years of age so that the developmental trends in the drawing of a "person" can be seen from age 6 through age 17. These two charts also present similar data from Harris' 1963 standardization group for comparison with the survey's findings. Twenty-three tables provide raw score data and norms for the modified GHDT in the form of standard scores and percentile equivalents. These data are presented for the "person" and "self" drawings by the type of drawing (man and woman) and the sex and age of the subject. (Author/MLP)

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The Goodenough-Harris Drawing Test as a Measure of Intellectual Maturity of Youths 12-17 Years

United States

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
Public Health Service
Health Resources Administration

Series 11 reports present findings from the National Health Examination Survey, which obtains data through direct examination, tests, and measurements of samples of the U.S. population. Reports 1 through 38 relate to the adult program, Cycle 1 of the Health Examination Survey. The present report is one of a number of reports of findings from the children and youth programs, Cycles II and III of the Health Examination Survey. These latter reports from Cycles II and III are being published in Series 11 but are numbered consecutively beginning with 101. It is hoped this will guide users to the data in which they are interested.

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Series 11
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The Goodenough-Harris Drawing Test as a Measure of Intellectual Maturity of Youths 12-17 Years

United States

A discussion of results from the application of the Goodenough-Harris Drawing Test scales to "person" and "self" drawings obtained in a national examination survey of noninstitutionalized youths 12-17 years of age.

DHEW Publication No. (HRA) 74-1620

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service

Health Resources Administration
National Center for Health Statistics
Rockville, Md. May 1974

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In accordance with specifications established by the National Center for Health Statistics, the Bureau of the Census, under a contractual agreement, participated in the design and selection of the sample, and carried out the first stage of the field interviewing and certain parts of the statistical processing.

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CONTENTS

	Page
Introduction	1
Field Administration and Scoring	2
Testing Procedures	2
Scoring	3
Drawings in the Psychological Study of Children	3
Results	6
Raw Scores	6
Comparison with Harris' Norms	8
Standard Scores and Percentiles	10
Discussion	12
Summary	14
References	15
List of Detailed Tables	16
Appendix I. Technical Notes	41
The Survey Design	41
Reliability	43
Missing Test Results and Imputation Procedures	44
Sampling and Measurement Error	45
Hypothesis Testing	45
Small Categories	46
Standard Scores	46
Appendix II. Cycle III Drawing Test Instructions	47

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THE GOODENOUGH-HARRIS DRAWING TEST AS A MEASURE OF INTELLECTUAL MATURITY OF YOUTHS

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INTRODUCTION

This report presents data obtained from a modified version of the Goodenough-Harris Drawing Test administered to a national probability sample of youths 12-17 years of age in the United States in the Health Examination Survey of 1966-70. Information presented here is essentially a continuation of that reported for children ages 6-11 in a previous publication of the *Vital and Health Statistics* series.[1] This is the first report on test findings among adolescents and is limited to consideration of age and sex differentials.

The Health Examination Survey is a program of the National Center for Health Statistics in which data are collected by direct examination of representative samples of the noninstitutionalized population of the United States. Since 1960 the Survey has been carried out in a series of separate programs (called "cycles") concerned with segments of the total population and focused on certain aspects of the health of that subpopulation. The data presented here were obtained in the third cycle, a survey of the Nation's youths aged 12-17 years. This program was a continuation of the previous cycle in which children 6-11 years old were given basically the same examination and which focused on health factors related to growth and development. Details regarding the surveys can be obtained in comprehensive reports on the children's program[2] and that of the youths.[3] Further information regarding the Cycle III survey design can be found in appendix I.

The survey of youths was started in March 1966 and field collection operations were completed in March 1970. Of the 7,514 youths selected for the sample, 6,768 (90 percent) were examined. This national sample may be considered representative of the roughly 23 million noninstitutionalized youths 12-17 years of age in the United States at the time of the survey.

A standardized 3-hour, single-visit examination of each youth was given by the examination team in specially designed mobile units used for the survey. Along with the physician's and dentist's examination and a variety of tests and measurements done by technicians, a 70-minute psychological test battery was administered by a psychologist. This battery contained the following procedures administered in the order listed: Wide Range Achievement Test, arithmetic and reading sections; Wechsler Intelligence Scale for Children, Vocabulary and Block Design subtests; five cards from the Thematic Apperception Test; a modified version of the Goodenough-Harris Drawing Test requesting a person and a self drawing; the Brief Test of Literacy; and a questionnaire covering certain health-related attitudes and behaviors. A critical evaluation of the tests and procedures selected, including a literature review of previous research and evaluations, was done on contract by S.B. Sells of Texas Christian University. The results have been published in the methodological series of *Vital and Health Statistics*.[4]

Before sample youths were examined, information was obtained from their parents. The information included demographic and socioeconomic data on household members as well as a medical history and behavioral data about the sample youth. Information regarding scholastic performance and adjustment was requested in a questionnaire sent to the youth's school.

FIELD ADMINISTRATION AND SCORING

Testing Procedures

Two human figure drawings were obtained from each youth during individual testing sessions. All tests were administered by psychologists who had obtained at least master's degrees and who had had previous experience administering tests. There were two psychologists with the examining team at all times. The examiners were selected, trained in field testing procedures, and supervised by the psychological advisory staff of the Health Examination Survey. In all training and supervision, strong emphasis was placed on uniform methods of test administration, scoring, and recording of data. During the course of the youths' survey, 12 psychologists worked in the field.

In the planning stages for Cycle III it was decided that instructions for the drawing test should provide for drawings of both a "person" figure and a "self" figure. It was also decided, as with the children's drawings from the previous survey, that all drawings would be scored in accordance with the 1963 Goodenough-Harris Drawing Test scales[5] in order to obtain a measure of intellectual maturity. During pilot testing of the survey examination it was found that the adolescent age group tended to take more time in completing the drawings than could be allowed within the time constraints imposed by the entire examination. Through observation it was determined that most youths could produce a complete and scoreable product within a period of 5-7 minutes but would then continue to make changes and additions which appeared to serve no noticeably constructive end. A further modification of the test instructions was then introduced. Each youth was told he would have 5 minutes to complete each drawing. In addition, examiners were instructed to allow a youth up to 7 minutes for completion of the drawing if it seemed necessary. (The instructions as they appeared in the Cycle III examiner's manual are presented in appendix II.) The drawings were made on forms specially printed for the survey; these forms provided the same size drawing area as those published for the 1963 Goodenough-Harris test. All drawings which were obviously incomplete at the end of the time allowed and any drawings which a youth said were not complete were judged to be invalid and so designated on the test form by the examiner. All invalid drawings were reviewed by supervisory personnel and the designation changed to valid when a drawing was judged to be complete enough for accurate scoring.

Because setting limits on the time allowed to draw is an important modification of the usual instructions for administering the Goodenough-Harris test, a special study was undertaken to compare the scores resulting from the evaluation of timed drawings versus untimed.[6] A group of 102 eighth grade students was tested in a counterbalanced design to assess the effects of group and individual administration of the tests. The effect of mode of administration was not statistically significant ($p. > .05$), and there was no interaction effect between mode of administration and order of presentation. This point being settled, the test was given to samples of secondary school students at ages 12, 14, and 16 in classroom groups for the purpose of assessing the effects of timed testing procedures compared to untimed. Two hundred students were selected at each age, so as to be representative of youths in the United States with respect to father's occupation as presented in the 1960 U.S. Bureau of the Census publications. Half of the youths in each age sample were tested under untimed conditions and half were tested according to the instructions designed for the Health Examination Survey. Although the difference in mean scores obtained under time and untimed modes of presentation was not significant at 12 years of age, it was significant at the .05 level for the 14- and 16-year-old groups.

The results under the Goodenough-Harris (untimed) mode of presentation were generally comparable with national norms, while those under the limited time fell below the conditions for the standard groups from 2-9 points; in half of the comparisons (by sex of child, sex of drawing, and instructions) the difference between means exceeded 3 points, but in only two conditions did the difference exceed 6 points. It was concluded that while limited time conditions may require different norms, the effect of the changed testing conditions would not necessarily invalidate the test.

Scoring

Each drawing was scored independently by two scorers using the appropriate Man or Woman scale of the Goodenough-Harris test. One total score for each drawing was then obtained by taking the average of the two scores. If the average score was not a whole number, the fraction was dropped.

Scoring was done under the direction of James L. McCarey at the University of Houston. A total of 17 scorers were trained and supervised by McCarey while scoring the youths' human figure drawings. Survey staff members and Dale B. Harris acted as consultants in the solution of problems regarding particular items in the scales. The supervisor of the scoring project was responsible for implementing quality control procedures in an effort to assure valid and reliable results. Interscorer reliability coefficients are all 0.86 or above (appendix I).

DRAWINGS IN THE PSYCHOLOGICAL STUDY OF CHILDREN

For many years psychologists, teachers, and perceptive parents have observed that young children use drawings as a "language" to express their knowledge and ideas. Presumably, then, a child's drawings obtained under prescribed circumstances might be used in the scientific study of the child's thought and behavior. In 1921 Sir Cyril Burt[7] included the drawing of a man as one of the tests of individual differences in abilities and performances of school children. He included this drawing because he had noted that there is a steady improvement with age in the detail and complexity of drawings. He also observed the extraordinary crudity of drawings by mentally retarded children, although they too tended to show some development with age. His hypothesis was that the abilities required by school work, notably absent in retarded children, might be reflected in the drawing performance. To arrive at an appropriate score in Burt's procedure, a child's drawing was compared with a set of examples considered as standards. This score was, however, only one of a number of components used in assessing ability and intelligence.

In 1926 Florence Goodenough published her Draw-A-Man Test,[8] which offered the first explicit, standardized instructions for administering and scoring a human figure drawing. She used the drawing of a man because the male figure is commonly found in collections of children's free drawings and is one of the first subjects spontaneously attempted by young children when they begin representative drawing at about age 3 or 4. She believed the male figure to be preferable to the female because the male garb, being less subject to fashion and stylistic change, represents a uniform stimulus which can be executed in varying degrees from the most simple schematic form to the most detailed representation.

Goodenough used the point score system; that is, she credited a single point for each of a series of features or parts described explicitly in the scoring instructions. These features were selected empirically to meet two criteria: in each successive age group a greater percentage of children included the feature, and duller children were less likely than brighter children to have included the feature. The latter criterion of intelligence was assessed very simply; children held back in school were considered to be relatively dull while those who were accelerated in school grade placement were thought to be the brighter children.

A total score was achieved by summing the individual points attained. This point score was transferred into a mental age (expressed in years and months) by plotting the mean point score values made by children in successive year age groups and interpolating intermediate values. According to procedures used at that time, the intelligence quotient (IQ) for a given child was calculated by taking the ratio of mental age in months to chronological age in months and multiplying by 100.

The Goodenough Draw-A-Man Test has been widely accepted in the repertoire of the child psychologist's tests. From the psychologist's point of view the test has many desirable features. The simple instructions to "draw a man, make the very best man you can" are not particularly intimidating. The child seldom thinks of his drawing as a test or examination; young children like to draw and frequently draw as a means of entertainment. Working on a "test" which resembles a familiar activity, a child usually behaves naturally and comfortably, setting the stage for the more formal testing which follows. Thus a drawing is a simple

device for establishing good rapport. Scoring can be deferred because the product rather than aspects of the performance is scored.

In addition to these aspects the Draw-A-Man Test has other virtues. It is a *performance* test; the child is *doing* something rather than saying something. This is an obvious advantage for a child with speech or hearing difficulties. The test is readily used in situations where complex verbal instructions may not be easily translated. Thus it can be used with children possessing language habits with which the psychologist may be unfamiliar. Moreover, this simple test has consistently yielded substantial correlations with complex verbal and individual measures of intellectual ability.[5]

Under the scrutiny of widespread use, however, Goodenough's test soon showed certain limitations. It tended to give decreasing IQ's in 10-, 11-, and 12-years-olds, suggesting that increments in mental age were not sufficiently calibrated and that the test was not adequately measuring abilities in the older age range of childhood. Furthermore, the original standardization was accomplished before modern concepts of sampling and representativeness had been developed. Goodenough's norms were clearly not adequate for contemporary use.

During the decade following World War II, a renewed interest in drawings focused on their use in assessing personality qualities such as aggressiveness, hostility, and insecurity and on features of psychological adjustment such as the feelings toward self and other people and the direction of sexual urges. There arose a widely accepted hypothesis that when the stimulus was an undesignated "person" rather than a "man," the sex of the figure drawn was significant in indicating unconscious sex role identification. Consequently, clinical psychologists more and more frequently collected human figure drawings in which sex was not designated by instruction for the first drawing. This practice is common today. A second drawing of the opposite sex to that of the first is usually requested. Frequently qualitative comparisons of the two figures are used to interpret personality dynamics.

No objective standards for scoring or evaluating such drawings were forthcoming and considerable experimentation by psychologists took place. A review of the literature by Cassel, Johnson, and Burns[9] in 1958 placed the reliability of such interpretations at a very low level. This fact is not surprising, considering the lack of standards for evaluation. Eventually several methods of evaluation were published. Machover[10] described her method in very general terms in 1949. Buck's House-Tree-Person Test (H-T-P),[11,12] published in 1948 and revised in 1966, is more specifically described, and some diagnostic features are made quite explicit by means of examples. The scoring manual gives a basis for estimating general intellectual level and goes into some detail concerning the assessment of personality and adjustment dynamics. Jolles[13] published his method for the H-T-P in 1952. Hammer's[14] suggestions concerning the H-T-P first appeared in 1954 and he collaborated in Buck's revision of 1969. Urban's[15] manual of signs (1963) for interpreting human figure drawings is limited entirely to personality characteristics. A recent addition to the use of human figure drawings is found in the Kenetic Family Drawing Manual published by Burns and Kaufman.[16] This procedure has the virtue of requiring the subject to draw figures "doing something," which increases the variety of material available for study.

Most of these methods of assessment or evaluation are based on the inspection of printed examples, sometimes arranged roughly by age and sometimes by psychiatric or psychologic diagnosis with a more or less brief description of the individual who produced the drawing. The Koppitz monograph[17] applies a more explicit and detailed method exclusively to children, and while the interpretation of intellectual level derived from the children's drawings is qualitative and hence does not yield as precise and reliable an index as might by wished, it does offer an empirically derived and data-supported method for interpreting signs of emotional disturbance which may appear in drawings.

Harris restandardized the Goodenough Draw-A-Man Test in the 1950's and published his work as the Goodenough-Harris Drawing Test in 1963.[5] He also developed a scale for evaluating the drawing of a woman as an alternate form. In both scales items were selected for scoring by three criteria: (1) if they were items included by progressively

age groups, (2) if they were included significantly more often by intellectually bright children than by intellectually dull children in each age sample, (3) if the items were included significantly more often by children in each age group scoring high on the test as a whole (less the contribution of the item concerned and other points based on that feature) than by children with low total test scores (less such contribution). A fourth criterion, extending the second, was furnished by substantial samples of mentally retarded children from educable classes. The percent of these children in each age group passing each item was well below that of dull children in regular school classes.

For the second criterion, bright children were considered to be all those in each age group scoring among the highest 25 percent on intelligence tests in school records and dull children were those scoring in the bottom 25 percent of each age group. The raw scores on the tests in school records were converted to standard scores to rule out differences in variability of scores among various tests. Because of the widespread use of "social promotion" in American schools in the 1950's, the simpler criterion of age-for-grade acceleration or retardation as an index of intellectual level was abandoned.

Considerable effort, described in some detail in Harris' text, was expended to extend the scale beyond 12 years, where Goodenough had terminated it. From Harris' work it is clear that the drawing test discriminates best among elementary school age children. The test reveals decreasing increments in growth after age 12 and these become minimal by midadolescence. Consequently Harris published norms only through age 15 and, even at this age, the distribution suggests that a "ceiling-effect" may seriously limit the variance in the upper portion of the curve.

The drawing of a woman can be assessed to yield a score which correlates substantially with the drawing of a man but not sufficiently to assert that this figure yields an identical estimate of intellectual maturity.

The restandardization confirmed Goodenough's earlier finding that girls do somewhat better than boys on the test, especially on the drawing of the woman. Harris concluded that this sex difference was more than a sampling effect ably to maturational, cultural, and perhaps drawing proficiency factors. Because sex differences appeared in many items throughout the scales, he did not eliminate such items but developed separate norms for boys and girls for each drawing.

In the revision the intelligence quotient concept defined as mental age divided by chronological age was abandoned. In keeping with more recent practice, a standard score method (sometimes called a deviation IQ) based on each age was substituted. In Harris' revision, a linear transformation of the distribution of raw scores into a distribution of standard scores with a mean of 100 and a standard deviation of 15 was employed within each year of age. In this process raw score means and standard deviations serve as the basis for the transformation (appendix I).

For psychological purposes the standard score has considerable descriptive and diagnostic value. The exceptionality of a particular score within the distribution for a selected age is given directly and the scores are statistically comparable from age to age. Moreover a standard score can be directly converted to a percentile score, which is more easily understood. For example, a drawing test (man) raw score of 62 achieved by a 13-year-old girl converts to a standard score of 127. Such a score is exceeded only by 4 percent of 13-year-old girls. It is clearly an exceptional score. It looks like an IQ, for an IQ of 127 is also superior, but this score is not a ratio of mental to chronological age and therefore not an IQ.

This standard score is perhaps more readily understood when converted to a percentile score, in this case 96. A percentile score of 95 on the drawing test is directly comparable with a percentile score of 96 achieved on an arithmetic achievement test. It expresses exactly the same degree of exceptionality when such scores are based on the performances of representative samples of children. Of course, each test is measuring different aspects of ability.

The Goodenough-Harris procedure includes the drawing of a woman as well as one of a man to supply a second estimate of ability, but the drawing of a man is always made first. In the Health Examination Survey, which began before the publication of the Harris volume, the more

general instruction to "draw a person" was used. As indicated earlier, in each case the scoring instructions appropriate to the sex of the figure drawn were used to score that figure. Thus in this report, four sets of data are presented—drawings of a man and of a woman by boys and drawings of a man and of a woman by girls.

An earlier report in this series presented similar data on the drawing test from Cycle II of the Health Examination Survey for children aged 6-11 years.[1] The findings of that study are briefly summarized here as a basis for considering the data on the adolescent population.

> Harris' conclusion that there are sex differences in raw scores on drawings of a man seems unwarranted, although girls appear to obtain higher scores than boys on drawings of a woman.
>
> Harris' original findings of a steady progression of drawing score with age are amply confirmed.
>
> The age curves portraying mean raw score performance for Harris' original standardization sample and for the sample of the Health Examination Survey diverge steadily from age 6 to age 11, with Harris' mean scores being greater. This finding is true for both sexes and for both drawings.

Discussion of this latter finding considered possible effects, such as the facilitating effect of the group settings (school classrooms) in which Harris' data were gathered compared to the greater control exercised in the individual test situation of the HES. Also pointed out was the obvious fact that the two tests are not the same—Harris asked for three drawings (man, woman, and self) in a prescribed sequence while in Cycle II only a "person" drawing was requested. Other factors considered in the discussion of the divergent findings were the effect of time constraint in the Cycle II procedure, differences in rigor of scoring, and the possibility that noncognitive factors are "projected" into human figure drawings, perhaps increasingly with age, and that these factors may confound the attempt to measure an intellective or cognitive factor. Finally, the differences between the sampling procedures used in the two studies were considered with the possibility that Harris' sample, drawn from a school population, contained persons already selected on the basis of intellectual ability.

RESULTS

Raw Scores

The data from the present study can be presented briefly. Table A, based on the population estimates from the survey, shows the percentages of youths of each sex who drew a male or a female figure in response to the instructions to draw a person. It was found that each sex showed a preference for drawing a figure of their own sex. Adolescent boys were somewhat more likely to draw male figures than were younger boys. Over the age spans of 6-11 years and 12-17 years, percentages of own-sex drawings were 84.0 and 88.6, respectively. Adolescent girls, however, were less likely than younger girls to draw a female figure. Here the percentages for children and adolescents were 80.8 and 75.0, respectively.

Table 1 presents raw score means and standard deviations for each type of drawing and each age and sex group.[a] Table 2 and figure 1 present the same information smoothed by the three-point moving average method to reduce the effects of errors of sampling. Harris' early conclusion, that age increments become negligible in the early teens and disappear by midadolescence, was corroborated. The growth curve clearly leveled by age 15. This trend was apparent for both sexes and for both man and woman drawings. On the man figure there were no significant sex differences in raw score means, although girls tended to do slightly better from age 12 to age

[a]The age recorded for each youth was his age at last birthday as of the date of examination. Age was confirmed by comparison with the date of birth entered on the youth's birth certificate. The age criterion for inclusion in the sample was defined as the age at time of the first interview. Since the examination usually took place 2-4 weeks after this interview, some of those who were 17 years old at the time of interview became 18 by the time of examination. There were 58 such cases. In weighting procedures and analysis, these youths were included in the 17-year-old group.

Table A. Number and percent of youths aged 12-17 in the noninstitutionalized population rated on the drawings of a man and a woman, by age and sex: United States, 1966-70

Age	Both sexes	Boys				Girls			
		Total	Man	Woman	None[1]	Total	Man	Woman	None[1]
	Number in thousands								
12-17 years	22,692	11,489	10,184	1,258	47	11,203	2,768	8,402	33
12 years	4,002	2,032	1,797	230	5	1,970	337	1,633	-
13 years	3,952	2,006	1,764	229	13	1,946	409	1,533	4
14 years	3,852	1,951	1,723	213	15	1,901	449	1,446	6
15 years	3,751	1,900	1,760	136	4	1,851	473	1,373	5
16 years	3,625	1,836	1,606	230	-	1,789	497	1,285	7
17 years	3,510	1,764	1,534	220	10	1,746	603	1,132	11
	Percent								
12-17 years	...	100.0	88.6	11.0	00.4	100.0	24.7	75.0	00.3
12 years	...	100.0	88.4	11.3	00.3	100.0	17.1	82.9	-
13 years	...	100.0	87.9	11.4	00.7	100.0	21.0	78.7	00.3
14 years	...	100.0	88.4	10.9	00.7	100.0	23.6	76.1	00.3
15 years	...	100.0	92.7	7.2	00.2	100.0	25.6	74.2	00.2
16 years	...	100.0	87.5	12.5	-	100.0	27.8	71.8	00.4
17 years	...	100.0	86.9	12.5	00.6	100.0	34.5	64.9	00.6

[1]Drawings not done because of factors attributable to the sample youths (blindness, physical disability, etc.); scores were not estimated.

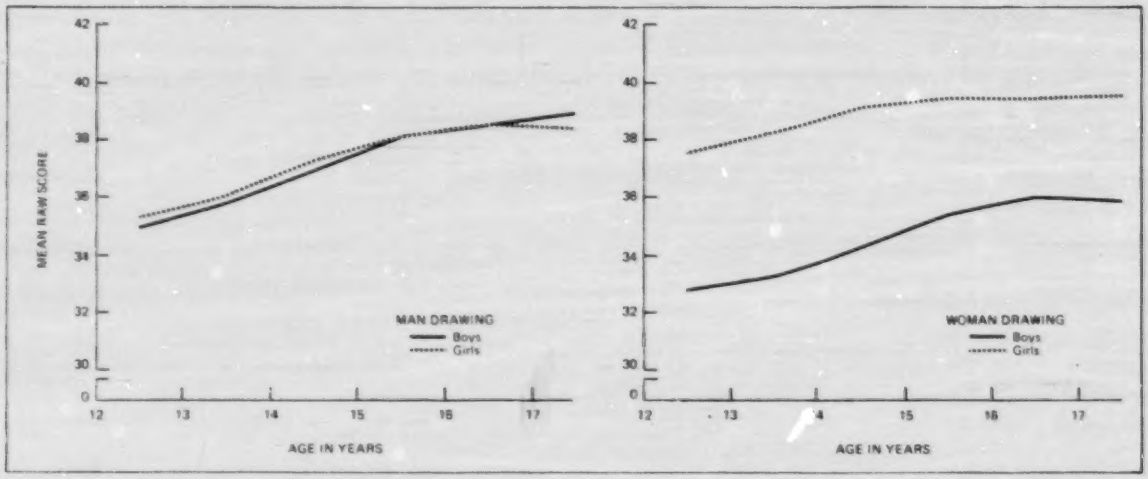

Figure 1. Mean raw scores (smoothed) for boys and girls 12-17 years of age on the man and woman scales of the Goodenough-Harris Drawing Test by age: United States, 1966-70.

16. On the woman figure, girls showed a consistent superiority as they did in the early study.[1] These differences were statistically significant in each age group.

The self drawings obtained in this study were scored on either the man or woman scale as appropriate. The results appear in table 3, both for raw and smoothed data. The mean values in table 3 are remarkably close to the mean values for same-sex drawings reported in tables 1 and 2 for boys and girls, respectively. In each age group boys consistently achieved slightly higher mean scores on the man figure than on the self figure. Girls earned slightly higher mean scores on the woman figure than on the self figure. The differences were very slight, in no case exceeding 1.0 score points, and were characteristically about half of a raw score point. This difference was well within the standard error of measurement which was approximately 3.0 points in the ages 12-15. However, the direction of the difference was consistent enough to warrant attention. One possible explanation is that a certain amount of fatigue and boredom affected the performance on the self drawing which was always the second task.

By selecting only those cases in which boys drew a male person and girls drew a female person, it was possible to test the significance of the difference between means of person and self figures. Results of this comparison are presented in table 4. All coefficients of correlation were significantly greater than zero and, in absolute terms, substantial—ranging from $r = .71$ for 12-year-old boys to $r = .85$ for 16-year-old boys and 17-year-old girls. For boys in each age group, none of the differences between person (man) scores and self scores were significant. For girls, mean person (woman) scores were higher than self scores in each age group with the differences being significant except for 16- and 17-year-olds.

It is not legitimate to directly compare scores for boys and girls on the self figure, as the point score scales for the male and female figures are not directly comparable, i.e., that for the female has slightly more scoreable points. This difference, plus the fact that girls appeared to draw the female figure more skillfully than boys did, would confound any direct comparison of scores.

The relationships among the various tests administered in the survey will be the subject of a future publication in this series; however, for this report the Goodenough-Harris scores were correlated with the WISC Vocabulary and Block Design raw scores and the results appear in table 5. The intercorrelations between person scores and self scores of the drawing test for single years of age ranged from .72 to .88 and compare favorably with the values reported in table 4, which were limited to those youths who drew person figures of the same sex as themselves. In general the correlations of drawing test with the Block Design scores (ranging from .32 to .51) tended to run slightly higher than with Vocabulary scores (ranging from .26 to .43). This difference, while not large, was almost entirely a function of boys' performances.

Comparison With Harris' Norms

Table B along with figures 2 and 3 present the data from the present study and from Cycle II in order to represent the development of the intellectual abilities measured by drawing scores for the entire range of ages 6-17 years. The data from Harris' original standardization are also presented for comparison. It can be seen that the trends established in the Cycle II data are continued in the present study. The slight tendency, which was consistent but statistically unreliable, for girls to draw the male figure in superior fashion disappeared by age 15 or 16. The convergence in performances of boys and girls on the male figure may be due to the fact that girls' scores were closer to the "ceiling" on the test. This explanation, that of a statistical artifact, is the most plausible one according to measurement theory. Mean raw scores in the present study were consistently lower than those of Harris' standardization group, continuing a trend found in the previous survey of children 6-11 years old.

The variability of scores for both boys and girls as shown by the standard deviations was less in the present study than in that of Harris. However, the *relative* variability measured by the ratio of the standard deviation to the mean appeared more comparable. These coefficients

Table B. Means and standard deviations (SD) on the man and woman scales of Goodenough-Harris Drawing Test for Harris' standardization group[1] and HES estimates for the United States[2] for boys and girls 6-17 years of age

Scale and age	Both sexes				Boys				Girls			
	Harris' standardization group[1]		HES sample[2]		Harris' standardization group[1]		HES sample[2]		Harris' standardization group[1]		HES sample[2]	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Man scale												
6 years-----	19.2	5.95	18.5	6.30	18.4	5.71	18.5	6.04	20.0	5.94	22.0	7.25
7 years-----	23.0	6.92	20.3	6.58	22.5	6.82	20.2	6.30	23.5	6.91	23.9	7.78
8 years-----	26.8	7.88	23.7	7.06	25.9	7.77	23.6	6.85	27.6	7.91	27.6	8.09
9 years-----	31.3	8.83	26.8	7.64	30.7	8.95	26.7	7.44	31.8	8.68	30.8	8.62
10 years----	35.4	9.65	29.6	8.31	34.5	9.84	29.5	8.14	36.3	9.35	33.7	9.09
11 years----	38.9	10.42	31.2	8.83	37.6	10.85	31.1	8.64	40.2	9.78	35.2	9.71
12 years----	41.6	10.77	35.0	7.56	40.3	11.01	34.9	7.63	43.0	10.32	35.3	7.18
13 years----	43.4	10.34	35.8	7.71	42.6	10.67	35.8	7.81	44.2	9.89	36.0	7.24
14 years----	44.9	10.05	37.0	7.85	44.7	10.51	36.9	7.97	45.1	9.57	37.3	7.33
15 years----	45.2	9.83	38.1	7.94	45.1	10.60	38.1	8.09	45.2	9.01	38.1	7.36
16 years----	---	---	38.5	8.00	---	---	38.5	8.05	---	---	38.5	7.72
17 years----	---	---	38.8	8.07	---	---	38.9	8.09	---	---	38.4	7.93
Woman scale												
6 years-----	20.8	7.07	22.4	6.51	18.8	6.41	19.4	5.60	22.8	7.08	22.9	6.68
7 years-----	25.2	7.78	24.3	6.78	23.3	7.17	21.4	5.90	27.0	7.88	24.8	6.96
8 years-----	29.5	8.57	27.7	7.28	27.6	7.93	24.4	6.86	31.3	8.73	28.4	7.37
9 years-----	33.7	8.71	30.8	7.77	32.1	8.37	27.1	7.54	35.3	8.80	31.6	7.83
10 years----	37.3	9.60	33.5	8.24	35.0	9.15	28.5	8.01	39.7	9.39	34.5	8.29
11 years----	40.3	9.96	35.0	8.52	37.3	9.53	29.6	8.19	43.3	9.41	36.0	8.58
12 years----	42.8	10.08	36.9	7.45	39.8	9.61	32.8	6.95	45.8	9.58	37.5	7.31
13 years----	44.7	9.88	37.6	7.55	42.0	9.61	33.2	7.56	47.4	9.37	38.2	7.31
14 years----	46.1	9.43	38.5	7.58	44.1	9.41	34.2	7.79	48.2	8.97	39.1	7.33
15 years----	46.3	9.10	38.9	7.59	44.4	9.31	35.4	7.75	48.2	8.48	39.4	7.42
16 years----	---	---	39.0	7.46	---	---	36.0	7.15	---	---	39.4	7.41
17 years----	---	---	38.9	7.66	---	---	35.9	7.15	---	---	39.5	7.61

[1]Harris, D.B.: Children's Drawings as Measures of Intellectual Maturity. New York. Harcourt, Brace, and World, Inc., 1963.

[2]Data for children 6-11 years old are from HES Cycle II; other data from Cycle III. See appendix I for explanation of the sampling and weighting procedures.

of variation appear in table 6. In the present study the coefficients of variation were relatively constant across the successive age groups for both boys and girls and for the self figure as well as the man and woman figures. This coefficient of variation has the value of permitting a comparison of dispersions of scores in different series where the means vary considerably in magnitude. A fairly constant relative variation over an ordered age-group series is desirable in educational and psychological measures, for as the mean score increases beyond zero, the

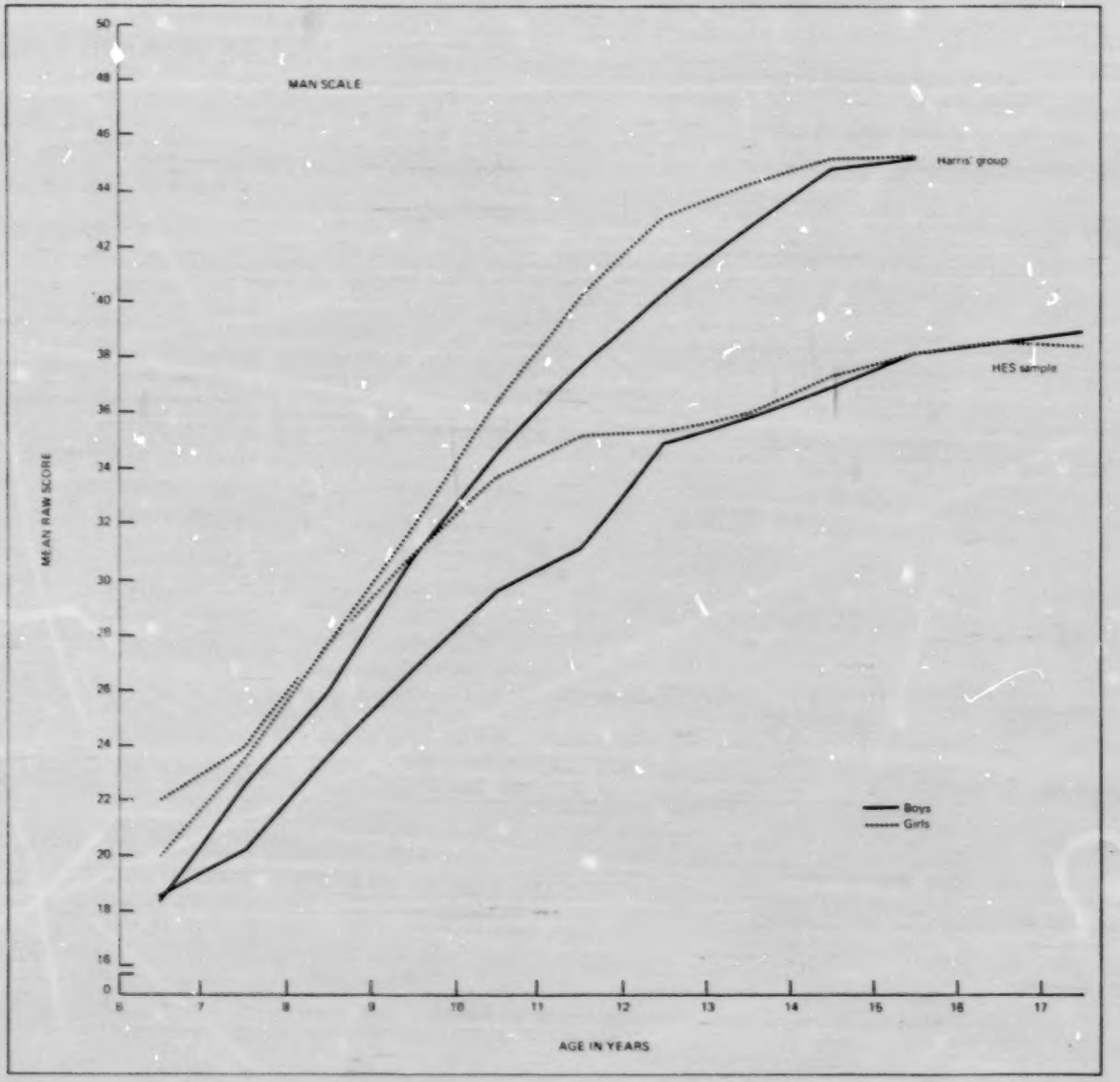

Figure 2. Mean raw scores (smoothed) on the man scale of the Goodenough-Harris Drawing Test for Harris' standardization group and the HES estimates for boys and girls 6-17 years of age: United States.

variability around that mean should increase roughly in proportion to the size of the mean. A relatively constant ratio of standard deviation to mean is one indication that the test has a sufficient number of items and is fairly consistent over the various groups in differentiating ability.

Standard Scores and Percentiles

In the Goodenough-Harris Drawing Test a point score is transformed into a standard score which is a relative measure and permits a direct comparison within his age group of a child's rel-

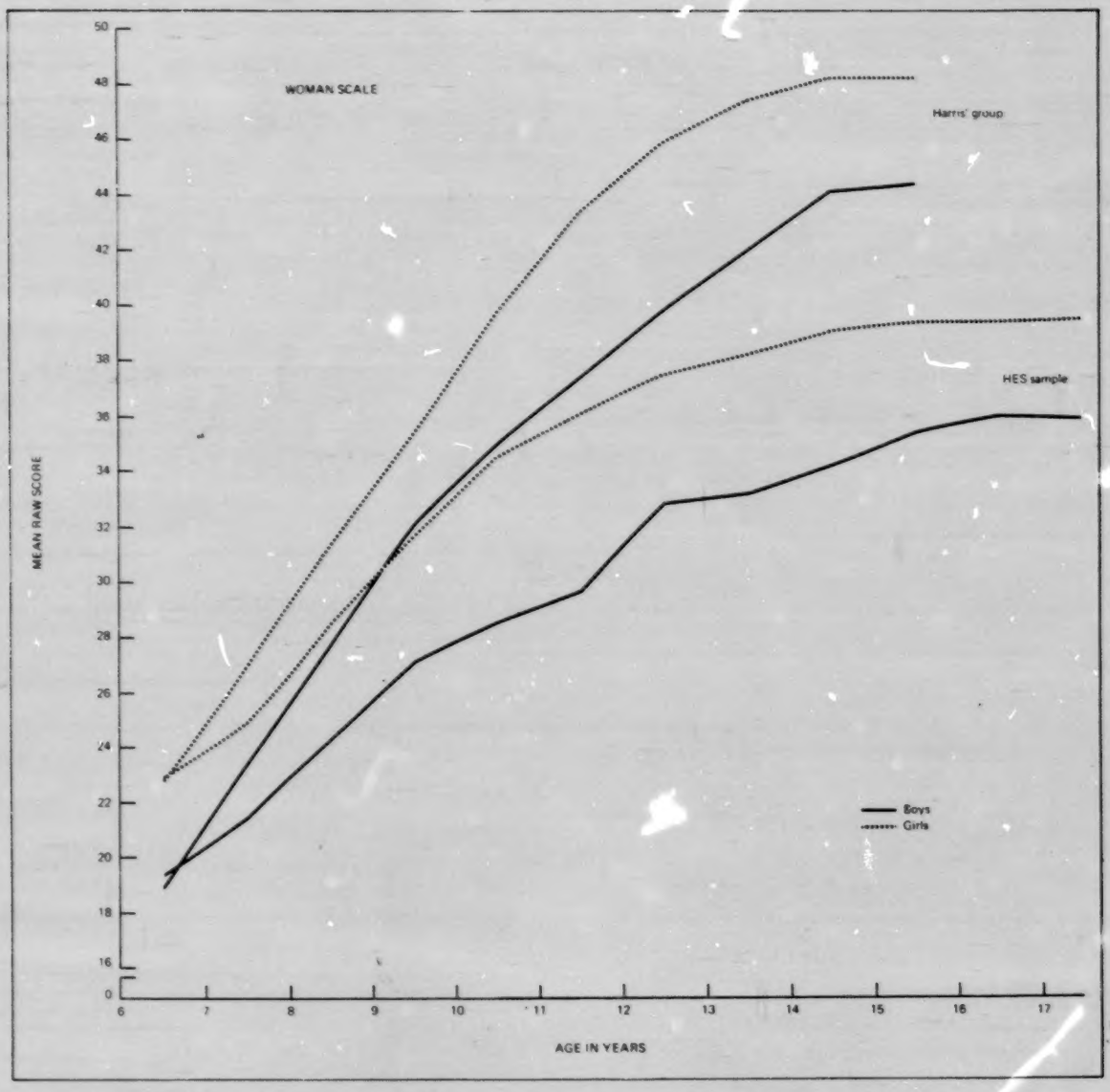

Figure 3. Mean raw scores (smoothed) on the woman scale of the Goodenough-Harris Drawing Test for Harris' standardization group and the HES estimates for boys and girls 6-17 years of age: United States.

ative standing on this test with his relative standing on other tests. It also permits direct comparisons of any two children regardless of age. Because of a consistent difference, at least on the woman figure, in the performances of boys and girls, a standard measure permits the direct comparison of particular boys and girls and makes it unnecessary to consider the sex difference in reporting the standing of groups. The standard score expresses the point scores in terms of deviations from their mean. The point scores for the youths in each 1-year age

group were converted to standard scores using means and standard deviation from the national sample. The standard scores corresponding to each set of point scores are shown in tables 7-14. In constructing these standard scores at each year of age, the mean has been set at 100 and the standard deviation at 15 points, consistent with the practice used by Harris in his development of this test and by Wechsler in his well-known tests for children and adults.[18-20] (See appendix I for additional information on construction of the standard scores presented in this report.)

Reference to figures 2 and 3 makes it at once apparent that at ages 12-17 years, sex differences in the drawing of a man were less substantial than the sex differences in the drawing of a woman. Reference to tables 7 and 8 reveals that sex differences on the man drawing were nevertheless sufficient to equal 1-6 standard score units for a given raw score point in the lower ages of adolescence. Thus for precise work standard scores from tables 7 and 8 should be used, while for more general approximations table 9 will be sufficient for both sexes. However, the sex differences demonstrated by the data in tables 10 and 11 were such that reference would commonly be to separate norms, and use of table 12 showing standard scores for boys and girls combined would not be advised.

The results of the present calibration, that is, the actual means and standard deviations of standard scores for the drawings from the survey, are presented in table 15 for boys and girls at each age level.

Percentile scores, actually percentile ranks for raw scores, appear in tables 16-23. The percentile rank—the relative standing in a theoretically representative sampling of 100 persons, is readily understood, and these tables are provided for those who think in terms of percentile ranks. The standard score is preferable if the data are to be subjected to statistical treatment.

DISCUSSION

The drawing task presented to the subjects of the Health Examination Survey was to "draw a person." Consequently it is not precisely the same task posed by the Goodenough-Harris Drawing Test. For reasons discussed elsewhere[1] it still seemed plausible to use the scoring standards of the latter test. The results obtained justify that decision. The growth curve of mean scores by age is very similar to that obtained by Harris in the standardization of the Goodenough-Harris Drawing Test. Age increments become negligible in early adolescence and disappear by the midteens. Assuming that the function measured has reached a "ceiling," the correlation between the self and person drawings, nevertheless, holds up surprisingly well. Harris has argued[5] that the test does not measure abstract components of intelligence as well as it does more concrete aspects. This conclusion is supported by the correlations, year by year, between human figure drawings scored by his standards and Wechsler's Vocabulary and Block Design tests in the present study. Correlations between drawing test scores and Vocabulary drop from about .40 in the early teens to around .30 in the midteens for both boys and girls. Twelve-year-old boys are the exception here and the noticeably lower intercorrelation of person and self scores in this age group suggests some anomaly, perhaps due to the vicissitudes of sampling. The correlations with the Block Design test, slightly higher for boys than for girls, maintain their characteristic level (.40 to .50 for boys; .35 to .45 for girls) throughout the age range of this study. As the Vocabulary test incorporates more abstract and difficult terms, it drops as a correlate of the drawing task; this is not so with the more visual and concrete Block Design test.

One finding of the present series of studies is somewhat at variance with earlier work. The superiority of girls over boys in drawing the male figure has fallen within chance limits in the present data though it appears consistently until the midteens. The superiority of girls on the female figure was confirmed and was maintained throughout the age range included in this study.

Although in his original study Harris did not standardize his scales with respect to the self figure,[5] the data of this study confirmed his assumption that the appropriate man or woman scoring standards may be applied to self drawings. The age curve of data was of the expected form, the mean scores of the girls' self drawings (scored on the woman scale) were higher

than those of the boys (scored of the man scale) as expected, and, most persuasively of all, the intercorrelations of the person and self scores were substantial (.71 to .85).

Although the present report has eschewed "projective" aspects of drawings, limiting itself to the measurement of intellective aspects, some findings bear on hypotheses frequently made in the clinical literature and warrant comment. An earlier report noted that in drawing a person of undesignated sex, children tended in the majority of cases to draw figures of their own sex.[1] The percentages in the Cycle II study varied with age from 88 to 81 for the boys and from 83 to 75 for the girls. There was no consistent trend by age among the boys and perhaps a slight trend toward declining percentages with age among the older girls.

In the present study the number of youths who drew same-sex figures varied among the age samples from 93 to 87 percent for boys and from 83 to 65 percent for girls. Again there was no discernible age trend for the boys but a noticeable and consistent trend with increasing age toward lower percentages of girls who drew female figures when asked to "draw a person." This finding appears to be in accord with the argument that women are influenced increasingly through childhood and adolescence by the preference given the masculine role in our society. That a girl may, as she grows older, increasingly reject what she perceives to be the less-favored feminine role can perhaps be argued from the data of this study. This could be an explanation for the trend which is slight but statistically significant in terms of the large numbers examined in this study.

In addition it was found that the self figure was consistently drawn almost as well by the girls as the female person figure. The difference, although statistically significant, was never more than 1 raw score point (table 4) where the standard error of the score is almost half a point. The difference could be attributed to fatigue or boredom with a second, similar task immediately following the person drawing.

The principal issue under discussion in the Cycle II report on the Goodenough-Harris test was the substantially lower performance of children in the Health Examination Survey sample in comparison with those represented in Harris' norms.[1] That finding is repeated in the data of the present report and also deserves comment. The difference in the adolescent years is approximately 6 or 7 raw score points, close to one standard deviation. This is a substantial difference. In the earlier report the following points were discussed as possible reasons for the difference: (1) Testing situation—Harris obtained his normative data in group classroom situations; the Health Examination Survey used entirely an individual testing situation. (2) Time limit—Harris did not constrain the time limits; in the present study the children were told to draw a person in 5 minutes although actually they were allowed 7. (3) Social facilitation—in group settings children frequently get ideas from neighbors; this is impossible in the individual test. (4) Bias in use of scoring standards—in one study scoring standards were more conservatively interpreted and more rigorously applied than in the other. (5) Nature of the task—the instructions given in the two studies are definitely different, the drawings being specified by sex in the one and a "person" being required in the other. (6) Differential selectivity, by personal and intellective characteristics, as between a child electing to draw a person of the same sex as himself and a child drawing an opposite sex person. (7) Differential selective factors governing admission and retention in school as between the years of Harris' study and the present one.

In the Cycle II study no one of the above factors was seen as explaining the observed difference. A multifactor hypothesis was preferred, with somewhat greater weight accorded to the last mentioned hypothesis. Now it has been demonstrated that drawings done under a strict time limit do tend to earn lower scores,[6] and one bit of evidence appears in this study which may lend more credence to the suggestion that bias in use of scoring standards accounts for some of the difference. It was noted in the earlier report[1] that "a few of the ambiguous points were redefined but in a conservative way." At all times the scorers in the Health Examination Survey teams were under conservative strictures. In the present study, two scorers directly under Dr. Harris' supervision rescored 224 cases drawn randomly from the Cycle III files (see appendix I). The observed mean difference between the two sets of

scores was approximately 3 raw score points, with Harris' scorers being the more liberal evaluators. A clear, conservative bias in the present study (or an unfortunately liberal bias in the author of the scoring standards), plus the constraints of limited time, minus the social facilitation afforded in the group setting may be sufficient to account for the observed differences. Any examiner using instructions similar to those of the present study should use the norms presented here.

Despite the differences in norms, this study strongly reinforces the evidence amassed by Harris in his revision and restandardization of the Goodenough Draw-a-Man Test as a measure of intellectual maturity. The spread of scores within each age, the appreciable gain in mean score until the early adolescent years, and the leveling off of mean score in the midteens, all argue that the test is more effective with children and of limited value with youths.

SUMMARY

As a part of the third cycle of the Health Examination Survey of 1966-70, a number of psychological tests were administered to a probability sample which closely represented the Nation's noninstitutionalized youths aged 12-17 years. One of these tests was a modification of the Goodenough-Harris Drawing Test of intellectual maturity. Each subject was asked to draw a "person," followed by a drawing of "yourself." The resulting drawings were then scored with the appropriate Goodenough-Harris man and woman scales. The great majority of boys elected to draw a male person; a somewhat smaller majority of girls, declining slightly with age, drew a female person. Scores derived from the drawings increase with age, leveling off at 16 or 17 years. There is a substantial correlation between person and self scores, which is generally maintained in the upper ages where the test is presumably reaching "ceiling." According to scoring standards, boys and girls earn similar scores on the male figure, but girls substantially excel in drawing the female figure. Norms derived from the present sample fall below Harris' published norms and probably reflect more conservative application of the scoring standards, the special conditions of individual examination and time constraint, and differences in obtaining a sample representative of the Nation's young people. Norms are supplied based on the sample examined and the conditions of testing in the Health Examination Survey.

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LIST OF DETAILED TABLES

Page

Table 1. Unsmoothed means and standard deviations (SD) of raw scores on the person drawings by youths aged 12-17 scored on the Goodenough-Harris Drawing Test man and woman scales, by sex and age: United States, 1966-70---------- 18

2. Smoothed means and standard deviations (SD) of raw scores on the person drawings by youths aged 12-17 scored on the Goodenough-Harris Drawing Test man and woman scales, by sex and age: United States, 1966-70---------- 19

3. Unsmoothed and smoothed means and standard deviations (SD) of raw scores on the self drawings by youths aged 12-17 scored on the Goodenough-Harris man scale for boys and woman scale for girls, by age: United States, 1966-70---------- 20

4. Comparison of mean raw scores on the person and self drawings (limited to cases in which youths drew same-sex person figures) and correlations between the two scores (r) and standard errors, by sex and age: United States, 1966-70---------- 21

5. Correlations between raw scores on person and self drawings and between drawing test scores and raw scores on the Vocabulary and Block Design subtests of the Wechsler Intelligence Scale for Children and standard errors, by sex and age: United States, 1966-70---------- 22

6. Coefficients of variation (standard deviation/mean) for raw scores on the Goodenough-Harris Drawing Test, by type of drawing, sex, and age: United States, 1966-70---------- 23

7. Standard score equivalents of raw scores for boys aged 12-17 on the person drawing as scored on the Goodenough-Harris man scale, by age: United States, 1966-70--- 24

8. Standard score equivalents of raw scores for girls aged 12-17 on the person drawing as scored on the Goodenough-Harris man scale, by age: United States, 1966-70--- 25

9. Standard score equivalents of raw scores for both sexes combined aged 12-17 on the person drawing as scored on the Goodenough-Harris man scale, by age: United States, 1966-70---------- 26

10. Standard score equivalents of raw scores for boys aged 12-17 on the person drawing as scored on the Goodenough-Harris woman scale, by age: United States, 1966-70---------- 27

11. Standard score equivalents of raw scores for girls aged 12-17 on the person drawing as scored on the Goodenough-Harris woman scale, by age: United States, 1966-70---------- 28

12. Standard score equivalents of raw scores for both sexes combined aged 12-17 on the person drawing as scored on the Goodenough-Harris woman scale, by age: United States, 1966-70---------- 29

13. Standard score equivalents of raw scores for boys aged 12-17 on the self drawing as scored on the Goodenough-Harris man scale, by age: United States, 1966-70---- 30

14. Standard score equivalents of raw scores for girls aged 12-17 on the self drawing as scored on the Goodenough-Harris woman scale, by age: United States, 1966-70---------- 31

15. Mean and standard deviations (SD) of standard scores for youths aged 12-17 on the Goodenough-Harris Drawing Test man and woman scales, by sex, age, and type of drawing: United States, 1966-70---------- 32

16. Percentile rank equivalents of raw scores for boys aged 12-17 on the person drawing as scored on the Goodenough-Harris man scale, by age: United States, 1966-70--- 33

17. Percentile rank equivalents of raw scores for girls aged 12-17 on the person drawing as scored on the Goodenough-Harris man scale, by age: United States, 1966-70--- 34

Page

Table 18. Percentile rank equivalents of raw scores for both sexes combined aged 12-17 on the person drawing as scored on the Goodenough-Harris man scale, by age: United States, 1966-70 ---- 35

19. Percentile rank equivalents of raw scores for boys aged 12-17 on the person drawing as scored on the Goodenough-Harris woman scale, by age: United States, 1966-70 ---- 36

20. Percentile rank equivalents of raw scores for girls aged 12-17 on the person drawing as scored on the Goodenough-Harris woman scale, by age: United States, 1966-70 ---- 37

21. Percentile rank equivalents of raw scores for both sexes combined aged 12-17 on the person drawing as scored on the Goodenough-Harris woman scale, by age: United States, 1966-70 ---- 38

22. Percentile rank equivalents of raw scores for boys aged 12-17 on the self drawing as scored on the Goodenough-Harris man scale, by age: United States, 1966-70 ---- 39

23. Percentile rank equivalents of raw scores for girls aged 12-17 on the self drawing as scored on the Goodenough-Harris woman scale, by age: United States, 1966-70 ---- 40

Table 1. Unsmoothed means and standard deviations (SD) of raw scores on the person drawings by youths aged 12-17 scored on the Goodenough-Harris Drawing Test man and woman scales, by sex and age: United States, 1966-70

Scale and age	Both sexes		Boys		Girls	
	Mean	SD	Mean	SD	Mean	SD
	Raw score					
Man scale						
12-17 years	37.2	8.02	37.1	8.11	37.5	7.69
12 years	34.4	7.41	34.4	7.48	34.8	7.02
13 years	35.5	7.70	35.4	7.77	35.8	7.33
14 years	37.5	8.01	37.6	8.16	37.3	7.36
15 years	37.9	7.85	37.7	7.98	38.6	7.29
16 years	38.8	7.96	38.9	8.12	38.3	7.42
17 years	38.8	8.17	38.9	8.06	38.5	8.45
Woman scale						
12-17 years	38.2	7.58	34.5	7.54	38.7	7.43
12 years	36.5	6.98	33.3	6.48	36.9	6.94
13 years	37.4	7.91	32.2	7.42	38.2	7.68
14 years	38.9	7.75	34.1	8.78	39.6	7.33
15 years	39.1	7.07	36.3	7.16	39.4	6.99
16 years	38.7	7.94	36.0	7.31	39.2	7.95
17 years	39.0	7.37	35.8	6.99	39.7	7.28

ings by youths aged 12-17 scored on the Goodenough-Harris Drawing Test man and woman scales, by sex and age: United States, 1966-70

Scale and age	Both sexes		Boys		Girls	
	Mean	SD	Mean	SD	Mean	SD
	Raw score					
Man scale						
12-17 years	37.2	8.02	37.1	8.11	37.5	7.69
12 years	35.0	7.56	34.9	7.63	35.3	7.18
13 years	35.8	7.71	35.8	7.81	36.0	7.24
14 years	37.0	7.85	36.9	7.97	37.3	7.33
15 years	38.1	7.94	38.1	8.09	38.1	7.36
16 years	38.5	8.00	38.5	8.05	38.5	7.72
17 years	38.8	8.07	38.9	8.09	38.4	7.93
Woman scale						
12-17 years	38.2	7.58	34.5	7.54	38.7	7.43
12 years	36.9	7.45	32.8	6.95	37.5	7.31
13 years	37.6	7.55	33.2	7.56	38.2	7.31
14 years	38.5	7.58	34.2	7.79	39.1	7.33
15 years	38.9	7.59	35.4	7.75	39.4	7.42
16 years	39.0	7.46	36.0	7.15	39.4	7.41
17 years	38.9	7.66	35.9	7.15	39.5	7.61

[1]Means and standard deviations smoothed by 3-point moving average. The end points at 12 years and 17 years have been estimated on the basis of 2-year data.

Table 3. Unsmoothed and smoothed[1] means and standard deviations (SD) of raw scores on the self drawings by youths aged 12-17 scored on the Goodenough-Harris man scale for boys and woman scale for girls, by age: United States, 1966-70

Age	Boys		Girls	
	Mean	SD	Mean	SD
	Unsmoothed raw score			
12-17 years	36.7	7.85	37.9	7.22
12 years	34.1	7.03	36.0	6.43
13 years	35.0	7.80	36.9	7.37
14 years	37.1	7.91	38.4	7.43
15 years	37.7	7.72	38.7	7.78
16 years	38.2	7.97	38.9	7.29
17 years	38.2	7.68	38.7	7.52
	Smoothed raw score			
12-17 years	36.7	7.85	37.9	7.22
12 years	34.5	7.41	36.5	6.90
13 years	35.4	7.58	37.1	7.07
14 years	36.6	7.81	38.0	7.19
15 years	37.7	7.87	38.7	7.17
16 years	38.0	7.79	38.7	7.20
17 years	38.2	7.83	38.8	7.41

[1]Means and standard deviations smoothed by 3-point moving average. The end points at 12 years and 17 years have been estimated on the basis of 2-year data.

Table 4. Comparison of mean raw scores on the person and self drawings (limited to cases in which youths drew same-sex person figures) and correlations between the two scores (r) and standard errors, by sex and age: United States, 1966-70

Sex and age	Number in thousands	Person		Self		t	r	Standard error of r
		Mean score	Standard error of mean	Mean score	Standard error of mean			
Boys		Man scale						
12 years	1,797	34.4	.31	34.6	.41	0.73	.71	.07
13 years	1,764	35.4	.30	35.2	.35	0.71	.84	.02
14 years	1,723	37.6	.49	37.4	.44	0.80	.82	.05
15 years	1,760	37.7	.48	37.7	.36	0.05	.83	.02
16 years	1,606	38.9	.57	38.5	.46	1.25	.85	.02
17 years	1,534	38.9	.35	38.5	.36	1.98	.80	.04
Girls		Woman scale						
12 years	1,633	36.9	.38	36.1	.32	[1]3.72	.83	.32
13 years	1,533	38.2	.47	37.2	.42	[1]3.89	.84	.02
14 years	1,446	39.6	.54	38.8	.50	[1]2.14	.74	.07
15 years	1,373	39.4	.41	38.7	.38	[1]2.88	.79	.05
16 years	1,285	39.3	.41	39.0	.43	1.03	.83	.02
17 years	1,132	39.7	.45	39.2	.53	1.76	.85	.02

[1]Significant at p = .05 or less.
t = t test for difference between person mean score and self mean score.

Table 5. Correlations between raw scores on person and self drawings and between drawing test scores and raw scores on the Vocabulary and Block Design subtests of the Wechsler Intelligence Scale for Children and standard errors, by sex and age: United States, 1966-70

Sex and age	Correlations					Standard errors of correlation coefficient				
	Person with self	Vocabulary		Block Design		Person with self	Vocabulary		Block Design	
		Person	Self	Person	Self		Person	Self	Person	Self
Boys										
12 years-----	.75	.26	.29	.37	.36	.071	.051	.048	.054	.037
13 years-----	.83	.39	.42	.45	.50	.062	.064	.058	.052	.035
14 years-----	.88	.44	.38	.51	.50	.015	.080	.071	.068	.060
15 years-----	.84	.37	.34	.40	.42	.022	.038	.041	.045	.044
16 years-----	.84	.30	.27	.46	.45	.019	.044	.046	.037	.039
17 years-----	.85	.28	.21	.42	.39	.035	.063	.067	.053	.058
Girls										
12 years-----	.82	.37	.38	.42	.44	.019	.038	.041	.038	.031
13 years-----	.86	.41	.43	.41	.43	.021	.050	.037	.058	.039
14 years-----	.73	.39	.42	.39	.40	.069	.069	.055	.055	.040
15 years-----	.80	.31	.27	.40	.39	.047	.103	.108	.074	.088
16 years-----	.86	.35	.33	.37	.32	.024	.051	.059	.048	.055
17 years-----	.72	.27	.28	.36	.37	.099	.053	.058	.041	.045

Table 6. Coefficients of variation (standard deviation/mean) for raw scores on the Goodenough-Harris Drawing Test, by type of drawing, sex, and age: United States, 1966-70

Age	Coefficients (SD/$\bar{x}$)		
	Both sexes	Boys	Girls
	Man figure		
12 years	0.215	0.218	0.201
13 years	0.217	0.220	0.205
14 years	0.213	0.217	0.197
15 years	0.207	0.212	0.189
16 years	0.205	0.209	0.193
17 years	0.210	0.207	0.219
	Woman figure		
12 years	0.191	0.194	0.188
13 years	0.212	0.231	0.201
14 years	0.199	0.257	0.185
15 years	0.181	0.197	0.177
16 years	0.205	0.203	0.202
17 years	0.189	0.196	0.184
	Self figure		
12 years	...	0.206	0.179
13 years	...	0.223	0.199
14 years	...	0.213	0.193
15 years	...	0.205	0.175
16 years	...	0.209	0.188
17 years	...	0.201	0.194

Table 7. Standard score equivalents of raw scores for boys aged 12-17 on the person drawing as scored on the Goodenough-Harris man scale, by age: United States, 1966-70

Raw score	Age in years						Raw score	Age in years					
	12	13	14	15	16	17		12	13	14	15	16	17
	Standard score							Standard score					
0	31	31	31	29	28	28	38	106	104	102	100	99	98
1	33	33	32	31	30	30	39	108	106	104	102	101	100
2	35	35	34	33	32	32	40	110	108	106	104	103	102
3	37	37	36	35	34	33	41	112	110	108	105	105	104
4	39	39	38	37	36	35	42	114	112	110	107	106	106
5	41	41	40	39	38	37	43	116	114	111	109	108	108
6	43	43	42	41	39	39	44	118	116	113	111	110	109
7	45	45	44	42	41	41	45	120	118	115	113	112	111
8	47	47	46	44	43	43	46	122	120	117	115	114	113
9	49	49	48	46	45	44	47	124	122	119	117	116	115
10	51	50	49	48	47	46	48	126	123	121	118	118	117
11	53	52	51	50	49	48	49	128	125	123	120	120	119
12	55	54	53	52	51	50							
							50	130	127	125	122	121	121
13	57	56	55	54	52	52	51	132	129	127	124	123	122
14	59	58	57	55	54	54	52	134	131	128	126	125	124
15	61	60	59	57	56	56	53	136	133	130	128	127	126
16	63	62	61	59	58	57	54	138	135	132	130	129	128
17	65	64	63	61	60	59	55	140	137	134	131	131	130
18	67	66	64	63	62	61	56	142	139	136	133	133	132
19	69	68	66	65	64	63	57	143	141	138	135	134	133
20	71	70	68	66	66	65	58	145	143	140	137	136	135
21	73	72	70	68	67	67	59	147	145	142	139	138	137
22	75	74	72	70	69	69	60	149	147	143	141	140	139
23	77	75	74	72	71	70	61	151	148	145	143	142	141
24	79	77	76	74	73	72							
							62	153	150	147	144	144	143
25	81	79	78	76	75	74	63	155	152	149	146	146	145
26	83	81	80	78	77	76	64	157	154	151	148	147	146
27	85	83	81	79	79	78	65	159	156	153	150	149	148
28	86	85	83	81	80	80	66	161	158	155	152	151	150
29	88	87	85	83	82	82	67	163	160	157	154	153	152
30	90	89	87	85	84	83	68	165	162	159	156	155	154
31	92	91	89	87	86	85	69	167	164	160	157	157	156
32	94	93	91	89	88	87	70	169	166	162	159	159	158
33	96	95	93	91	90	89	71	171	168	164	161	160	159
34	98	97	95	92	92	91	72	173	170	166	163	162	161
35	100	98	96	94	93	93	73	175	171	168	165	164	163
36	102	100	98	96	95	95							
37	104	102	100	98	97	96							

Table 8. Standard score equivalents of raw scores for girls aged 12-17 on the person drawing as scored on the Goodenough-Harris man scale, by age: United States, 1966-70

Raw score	Age in years						Raw score	Age in years					
	12	13	14	15	16	17		12	13	14	15	16	17
	Standard score							Standard score					
0	26	25	24	22	22	22	38	106	104	102	100	99	99
1	28	27	26	24	24	24	39	108	106	104	102	101	101
2	30	30	28	26	26	26	40	110	108	106	104	103	103
3	32	32	30	28	28	28	41	112	110	108	106	105	105
4	34	34	32	30	30	30	42	114	112	110	108	107	107
5	37	36	34	33	32	32	43	116	115	112	110	109	109
6	39	38	36	35	34	34	44	118	117	114	112	111	111
7	41	40	38	37	36	36	45	120	119	116	114	113	112
8	43	42	40	39	38	38	46	122	121	118	116	115	114
9	45	44	42	41	40	40	47	124	123	120	118	117	116
10	47	46	44	43	42	42	48	126	125	122	120	118	118
11	49	48	46	45	44	44	49	129	127	124	122	120	120
12	51	50	48	47	46	46							
							50	131	129	126	124	122	122
13	53	52	50	49	48	48	51	133	131	128	126	124	124
14	55	54	52	51	50	50	52	135	133	130	128	126	126
15	57	57	54	53	53	53	53	137	135	132	130	128	128
16	60	59	56	55	55	55	54	139	137	134	132	130	129
17	62	61	56	57	57	57	55	141	139	136	134	132	131
18	64	63	61	59	59	59	56	143	141	138	137	134	133
19	66	65	63	61	61	61	57	145	144	140	139	136	135
20	68	67	65	63	63	63	58	147	146	142	141	138	137
21	70	69	67	65	65	65	59	149	148	145	143	140	139
22	72	71	69	67	67	67	60	152	150	147	145	142	141
23	74	73	71	69	69	69	61	154	152	149	147	144	143
24	76	75	73	71	71	71							
							62	156	154	151	149	146	145
25	78	77	75	73	73	73	63	158	156	153	151	148	146
26	80	79	77	75	75	75	64	160	158	155	153	150	148
27	83	81	79	77	77	77	65	162	160	157	155	151	150
28	85	83	81	80	80	80	66	164	162	159	157	153	152
29	87	86	83	82	82	82	67	166	164	161	159	155	154
30	89	88	85	84	84	84	68	168	166	163	161	157	156
31	91	90	87	86	85	85	69	170	168	165	163	159	158
32	93	92	89	88	87	87	70	172	170	167	165	161	160
33	95	94	91	90	89	89	71	175	173	169	167	163	162
34	97	96	93	92	91	91	72	177	175	171	169	165	163
35	99	98	95	94	93	93	73	179	177	173	171	167	165
36	101	100	97	96	95	95							
37	103	102	99	98	97	97							

Table 9. Standard score equivalents of raw scores for both sexes combined aged 12-17 on the person drawing as scored on the Goodenough-Harris man scale, by age: United States, 1966-70

Raw score	Age in years						Raw score	Age in years					
	12	13	14	15	16	17		12	13	14	15	16	17
	Standard score							Standard score					
0	31	30	29	28	28	28	38	106	104	102	100	99	98
1	33	32	31	30	30	30	39	108	106	104	102	101	100
2	35	34	33	32	32	32	40	110	108	106	104	103	102
3	37	36	35	34	34	33	41	112	110	108	106	105	104
4	39	38	37	36	36	35	42	114	112	110	107	107	106
5	41	40	39	38	38	37	43	116	114	112	109	108	108
6	43	42	41	39	39	39	44	118	116	113	111	110	110
7	45	44	43	41	41	41	45	120	118	115	113	112	112
8	46	46	45	43	43	43	46	122	120	117	115	114	113
9	48	48	47	45	45	45	47	124	122	119	117	116	115
10	50	50	48	47	47	46	48	126	124	121	119	118	117
11	52	52	50	49	48	48	49	128	126	123	121	120	119
12	54	54	52	51	50	50	50	130	128	125	123	122	121
13	56	56	54	53	52	52	51	132	130	127	124	123	123
14	58	58	56	55	54	54	52	134	131	129	126	125	125
15	60	59	58	56	56	56	53	136	133	131	128	127	126
16	62	61	60	58	58	58	54	138	135	133	130	129	128
17	64	63	62	60	60	59	55	140	137	134	132	131	130
18	66	65	64	62	62	61	56	142	139	136	134	133	132
19	68	67	66	64	63	63	57	144	141	138	136	135	134
20	70	69	68	66	65	65	58	146	143	140	138	137	136
21	72	71	69	68	67	67	59	148	145	142	140	138	138
22	74	73	71	70	69	69	60	150	147	144	141	140	139
23	76	75	73	72	71	71	61	152	149	146	143	142	141
24	78	77	75	73	73	72	62	154	151	148	145	144	143
25	80	79	77	75	75	74	63	156	153	150	147	146	147
26	82	81	79	77	77	76	64	158	155	152	149	148	149
27	84	83	81	79	78	78	65	160	157	154	151	150	150
28	86	85	83	81	80	80	66	162	159	155	153	152	152
29	88	87	85	83	82	82	67	164	161	157	155	153	153
30	90	89	87	85	84	84	68	166	163	159	157	155	154
31	92	91	89	87	86	85	69	168	165	161	158	157	156
32	94	93	91	89	88	87	70	170	167	163	160	159	158
33	96	95	92	90	90	89	71	172	168	165	162	161	160
34	98	96	94	92	92	91	72	174	170	167	164	163	162
35	100	98	96	94	93	93	73	176	172	169	166	165	164
36	102	100	98	96	95	95							
37	104	102	100	98	97	97							

Table 10. Standard score equivalents of raw scores for boys aged 12-17 on the person drawing as scored on the Goodenough-Harris woman scale, by age: United States, 1966-70

Raw score	Age in years						Raw score	Age in years					
	12	13	14	15	16	17		12	13	14	15	16	17
	Standard score							Standard score					
0	34	34	34	31	25	25	38	111	109	107	105	104	104
1	36	36	36	33	27	27	39	113	111	109	107	106	106
2	38	38	38	35	29	29	40	116	113	111	109	108	108
3	40	40	40	37	31	31	41	118	115	113	111	111	111
4	42	42	42	39	33	33	42	120	117	115	113	113	113
5	44	44	44	41	35	35	43	122	119	117	115	115	115
6	46	46	46	43	37	37	44	124	121	119	117	117	117
7	48	48	48	45	39	39	45	126	123	121	119	119	119
8	50	50	50	47	41	41	46	129	125	123	121	121	121
9	52	52	52	49	43	43	47	131	127	125	123	123	123
10	54	54	53	51	46	46	48	133	129	127	125	125	125
11	56	56	55	53	48	48	49	135	131	129	127	127	127
12	58	58	57	55	50	50	50	137	133	130	129	129	129
13	60	60	59	57	52	52	51	139	135	132	131	131	131
14	62	62	61	59	54	54	52	142	137	134	133	133	133
15	64	64	63	60	56	56	53	144	139	136	135	135	135
16	66	66	65	62	58	58	54	146	141	138	137	137	137
17	68	68	67	64	60	60	55	148	143	140	140	140	140
18	70	70	69	66	62	62	56	150	145	142	142	142	142
19	72	72	71	68	64	64	57	152	147	144	144	144	144
20	74	74	73	70	66	66	58	154	149	146	146	146	146
21	76	76	75	72	69	69	59	157	151	148	148	148	148
22	78	78	77	74	71	71	60	159	153	150	150	150	150
23	80	80	78	76	73	73	61	161	155	152	152	152	152
24	82	82	80	78	75	75	62	163	157	154	154	154	154
25	84	84	82	80	77	77	63	165	159	156	156	156	156
26	86	86	84	82	79	79	64	167	161	158	157	157	157
27	88	88	86	84	81	81	65	170	163	160	159	159	159
28	90	90	88	86	83	83	66	172	165	162	161	161	161
29	92	92	90	88	85	85	67	174	167	164	163	163	163
30	94	94	92	89	87	87	68	176	169	166	165	165	165
31	96	96	94	91	90	90	69	178	171	168	167	167	167
32	98	98	96	93	92	92	70	180	173	170	169	169	169
33	101	100	98	95	94	94	71	183	175	172	171	171	171
34	103	102	100	97	96	96							
35	105	104	102	99	98	98							
36	107	106	104	101	100	100							
37	109	108	105	103	102	102							

Table 11. Standard score equivalents of raw scores for girls aged 12-17 on the person drawing as scored on the Goodenpugh-Harris woman scale, by age: United States, 1966-70

Raw score	Age in years						Raw score	Age in years					
	12	13	14	15	16	17		12	13	14	15	16	17
	Standard score							Standard score					
0	23	22	20	20	20	20	38	101	100	98	97	97	97
1	25	24	22	22	22	22	39	103	102	100	99	99	99
2	27	26	24	24	24	24	40	105	104	102	101	101	101
3	29	28	26	26	26	26	41	107	106	104	103	103	103
4	31	30	28	28	28	28	42	109	108	106	105	105	105
5	33	32	30	30	30	30	43	111	110	108	107	107	107
6	35	34	32	32	32	32	44	113	112	110	109	109	109
7	37	36	34	34	34	34	45	115	114	112	111	111	111
8	39	38	36	36	36	36	46	117	116	114	113	113	113
9	41	40	38	38	38	38	47	119	118	116	115	115	115
10	43	42	41	41	40	40	48	121	120	118	117	117	117
11	46	44	43	43	42	42	49	123	122	120	119	119	119
12	48	46	45	45	44	44	50	126	124	122	121	121	121
13	50	48	47	47	46	46	51	128	126	124	123	123	123
14	52	50	49	49	48	48	52	130	128	126	125	125	125
15	54	52	51	51	50	50	53	132	130	128	127	127	127
16	56	54	53	53	53	53	54	134	132	131	129	129	129
17	58	56	55	55	55	55	55	136	134	133	131	131	131
18	60	58	57	57	57	57	56	138	136	135	133	133	133
19	62	61	59	59	59	59	57	140	138	137	136	136	135
20	64	63	61	61	61	61	58	142	141	139	138	138	137
21	66	65	63	63	63	63	59	144	143	141	140	140	139
22	68	67	65	65	65	65	60	146	145	143	142	142	140
23	70	69	67	67	67	67	61	148	147	145	144	144	142
24	72	71	69	69	69	69	62	150	149	147	146	146	144
25	74	73	71	71	71	71	63	152	151	149	148	148	146
26	76	75	73	73	73	73	64	154	153	151	150	150	148
27	78	77	75	75	75	75	65	156	155	153	152	152	150
28	80	79	77	77	77	77	66	158	157	155	154	154	152
29	82	81	79	79	79	79	67	160	159	157	156	156	154
30	85	83	81	81	81	81	68	162	161	159	158	158	156
31	87	85	83	83	83	83	69	165	163	161	160	160	158
32	89	87	86	85	85	85	70	167	165	163	162	162	160
33	91	89	88	87	87	87	71	169	167	165	164	164	162
34	93	91	90	89	89	89							
35	95	93	92	91	91	91							
36	97	95	94	93	93	93							
37	99	97	96	95	95	95							

Table 12. Standard score equivalents of raw scores for both sexes combined aged 12-17 on the person drawing as scored on the Goodenough-Harris woman scale, by age: United States, 1966-70

Raw score	Age in years						Raw score	Age in years					
	12	13	14	15	16	17		12	13	14	15	16	17
	Standard score							Standard score					
0	26	25	24	23	22	22	38	102	101	99	98	98	98
1	28	27	26	25	24	24	39	104	103	101	100	100	100
2	30	29	28	27	26	26	40	106	105	103	102	102	102
3	32	31	30	29	28	28	41	108	107	105	104	104	104
4	34	33	32	31	30	30	42	110	109	107	106	106	106
5	36	35	34	33	32	32	43	112	111	109	108	108	108
6	38	37	36	35	34	34	44	114	113	111	110	110	110
7	40	39	38	37	36	36	45	116	115	113	112	112	112
8	42	41	40	39	38	38	46	118	117	115	114	114	114
9	44	43	42	41	40	40	47	120	119	117	116	116	116
10	46	45	44	43	42	42	48	122	121	119	118	118	118
11	48	47	46	45	44	44	49	124	123	121	120	120	120
12	50	49	48	47	46	46	50	126	125	123	122	122	122
13	52	51	50	49	48	48	51	128	127	125	124	124	124
14	54	53	52	51	50	50	52	130	129	127	126	126	126
15	56	55	54	53	52	52	53	132	131	129	128	128	128
16	58	57	55	55	54	54	54	134	133	131	130	130	130
17	60	59	57	57	56	56	55	136	135	133	132	132	132
18	62	61	59	59	58	58	56	138	137	135	134	134	134
19	64	63	61	61	60	60	57	140	139	137	136	136	135
20	66	65	63	63	62	62	58	142	141	139	138	138	137
21	68	67	65	65	64	64	59	144	143	141	140	140	139
22	70	69	67	67	66	66	60	146	145	143	142	142	141
23	72	71	69	68	68	68	61	148	147	145	144	144	143
24	74	73	71	70	70	70	62	150	148	147	146	146	145
25	76	75	73	72	72	72	63	152	150	149	148	148	147
26	78	77	75	74	74	74	64	155	152	151	150	150	149
27	80	79	77	76	76	76	65	157	154	153	152	152	151
28	82	81	79	78	78	78	66	159	156	154	154	154	153
29	84	83	81	80	80	80	67	161	158	156	155	155	155
30	86	85	83	82	82	82	68	163	160	158	157	157	157
31	88	87	85	84	84	84	69	165	162	160	159	159	159
32	90	89	87	86	86	86	70	167	164	162	161	161	161
33	92	91	89	88	88	88	71	169	166	164	163	163	163
34	94	93	91	90	90	90							
35	96	95	93	92	92	92							
36	98	97	95	94	94	94							
37	100	99	97	96	96	96							

Table 13. Standard score equivalents of raw scores for boys aged 12-17 on the self drawing as scored on the Goodenough-Harris man scale, by age: United States, 1966-70

Raw score	Age in years						Raw score	Age in years					
	12	13	14	15	16	17		12	13	14	15	16	17
	Standard score							Standard score					
0	30	30	30	28	27	27	38	107	105	103	101	100	100
1	32	32	32	30	29	29	39	109	107	105	103	102	101
2	34	34	34	32	31	31	40	111	109	107	104	104	103
3	36	36	35	34	33	32	41	113	111	108	106	106	105
4	38	38	37	36	34	34	42	115	113	110	108	108	107
5	40	40	39	38	36	36	43	117	115	112	110	110	109
6	42	42	41	40	38	38	44	119	117	114	112	111	111
7	44	44	43	42	40	40	45	121	119	116	114	113	113
8	46	46	45	43	42	42	46	123	121	118	116	115	115
9	48	48	47	45	44	44	47	125	123	120	118	117	117
10	50	50	49	47	46	46	48	127	125	122	120	119	119
11	52	52	51	49	48	48	49	129	127	124	122	121	121
12	54	54	53	51	50	50	50	131	129	126	124	123	123
13	56	56	55	53	52	52	51	133	131	128	125	125	124
14	58	58	57	55	54	54	52	135	133	130	127	127	126
15	60	60	59	57	56	55	53	137	135	132	129	129	128
16	62	62	60	59	58	57	54	139	137	133	131	131	130
17	64	64	62	61	59	59	55	141	139	135	133	133	132
18	66	66	64	63	61	61	56	143	141	137	135	135	134
19	69	68	66	64	63	63	57	145	143	139	137	136	136
20	71	70	68	66	65	65	58	147	145	141	139	138	138
21	73	72	70	68	67	67	59	149	147	143	141	140	140
22	75	73	72	70	69	69	60	152	149	145	143	142	142
23	77	75	74	72	71	71	61	154	151	147	144	144	144
24	79	77	76	74	73	73	62	156	153	149	146	146	146
25	81	79	78	76	75	75	63	158	155	151	148	148	147
26	83	81	80	78	77	77	64	160	157	153	150	150	149
27	85	83	82	80	79	78	65	162	159	155	152	152	151
28	87	85	83	82	81	80	66	164	161	156	154	154	153
29	89	87	85	83	83	82	67	166	163	158	156	156	155
30	91	89	87	85	84	84	68	168	165	160	158	158	157
31	93	91	89	87	86	86	69	170	167	162	160	160	159
32	95	93	91	89	88	88	70	172	169	164	162	161	161
33	97	95	93	91	90	90	71	174	170	166	164	163	163
34	99	97	95	93	92	92	72	176	172	168	165	165	165
35	101	99	97	95	94	94	73	178	174	170	167	167	167
36	103	101	99	97	96	96							
37	105	103	101	99	98	98							

Table 14. Standard score equivalents of raw scores for girls aged 12-17 on the self drawing as scored on the Goodenough-Harris woman scale, by age: United States, 1966-70

Raw score	Age in years						Raw score	Age in years					
	12	13	14	15	16	17		12	13	14	15	16	17
	Standard score							Standard score					
0	21	21	21	19	19	19	38	103	102	100	99	98	98
1	23	23	23	21	21	21	39	106	104	102	101	101	100
2	25	25	25	23	23	23	40	108	106	104	103	103	102
3	27	27	27	25	25	25	41	110	108	106	105	105	105
4	29	29	29	27	27	27	42	112	110	108	107	107	107
5	32	32	31	30	30	30	43	114	112	110	109	109	109
6	34	34	33	32	32	32	44	116	115	112	111	111	111
7	36	36	35	34	34	34	45	119	117	115	113	113	113
8	38	38	37	36	36	36	46	121	119	117	115	115	115
9	40	40	39	38	38	38	47	123	121	119	117	117	117
10	43	43	42	40	40	40	48	125	123	121	120	119	119
11	45	45	44	42	42	42	49	127	125	123	122	121	121
12	47	47	46	44	44	44							
							50	129	127	125	124	123	123
13	49	49	48	46	46	46	51	132	129	127	126	126	125
14	51	51	50	48	48	48	52	134	132	129	128	128	127
15	53	53	52	50	50	50	53	136	134	131	130	130	129
16	56	55	54	53	53	53	54	138	136	133	132	132	131
17	58	57	56	55	55	55	55	140	138	135	134	134	133
18	60	59	58	57	57	57	56	142	140	137	136	136	135
19	62	62	60	59	59	59	57	145	142	140	138	138	137
20	64	64	62	61	61	61	58	147	144	142	140	140	139
21	66	66	64	63	63	63	59	149	146	144	143	142	141
22	69	68	67	65	65	65	60	151	149	146	145	144	143
23	71	70	69	67	67	67	61	153	151	148	147	146	145
24	73	72	71	69	69	69							
							62	156	153	150	149	148	147
25	75	74	73	71	71	71	63	158	155	152	151	151	149
26	77	76	75	73	73	73	64	160	157	154	153	153	151
27	79	79	77	76	76	76	65	162	159	156	155	155	153
28	82	81	79	78	78	78	66	164	161	158	157	157	155
29	84	83	81	80	80	80	67	166	163	160	159	159	157
30	86	85	83	82	82	82	68	169	165	163	161	161	159
31	88	87	85	84	84	84	69	171	168	165	163	163	161
32	90	89	87	86	86	86	70	173	170	167	166	165	163
33	92	91	90	88	88	88	71	175	172	169	168	167	165
34	95	93	92	90	90	90							
35	97	96	94	92	92	92							
36	99	98	96	94	94	94							
37	101	100	98	96	96	96							

Table 15. Means and standard deviations (SD) of standard scores for youths aged 12-17 on the Goodenough-Harris Drawing Test man and woman scales, by sex, age, and type of drawing: United States, 1966-70

Type of drawing, scale, and age	Both sexes		Boys		Girls	
	Mean	SD	Mean	SD	Mean	SD
Man scale						
12-17 years	99.9	15.06	99.9	15.01	99.9	15.25
12 years	98.9	14.70	98.9	14.72	98.9	14.60
13 years	99.3	14.99	99.2	14.93	99.7	15.24
14 years	101.1	15.31	101.3	15.33	100.0	15.16
15 years	99.6	14.84	99.2	14.84	101.3	14.71
16 years	100.5	15.02	100.7	15.14	99.6	14.61
17 years	100.0	15.41	100.1	14.95	99.9	16.50
Woman scale						
12-17 years	99.9	14.94	100.0	14.99	99.9	14.93
12 years	99.1	14.14	101.4	13.73	98.7	14.16
13 years	99.6	15.63	98.0	14.49	99.9	15.78
14 years	101.0	15.22	99.9	16.90	101.2	14.95
15 years	100.0	14.03	101.7	14.10	99.9	14.01
16 years	99.6	15.84	99.9	15.32	99.5	15.93
17 years	100.2	14.59	99.5	14.68	100.3	14.57
Self drawing						
12-17 years	...	...	99.9	14.96	99.9	15.03
12 years	...	...	99.2	14.09	98.9	14.02
13 years	...	...	99.0	15.51	99.6	15.60
14 years	...	...	100.9	15.21	100.8	15.49
15 years	...	...	100.1	14.74	100.0	14.22
16 years	...	...	100.3	15.38	100.3	15.19
17 years	...	...	100.0	14.73	99.7	15.59

Table 16. Percentile rank equivalents of raw scores for boys aged 12-17 on the person drawing as scored on the Goodenough-Harris man scale, by age: United States, 1966-70

Percentile	Age in years						
	12-17	12	13	14	15	16	17
	Raw score						
99	55	53	52	56	55	56	55
98	54	51	50	54	54	56	54
97	52	50	49	53	54	55	52
96	51	49	48	52	53	52	52
95	50	47	48	51	52	52	51
90	47	44	45	47	48	50	49
85	45	42	44	46	45	47	47
80	44	40	43	44	44	45	46
75	43	40	41	43	43	44	45
70	41	38	40	42	42	43	44
65	40	37	39	41	41	42	43
60	39	36	37	40	40	41	41
55	38	35	36	39	39	40	40
50	37	34	36	38	38	39	39
45	36	33	35	37	37	38	38
40	35	32	34	36	36	37	38
35	34	31	33	35	35	36	36
30	33	31	31	34	34	35	35
25	32	30	30	32	32	34	34
20	30	28	28	31	31	32	33
15	29	27	27	30	29	31	31
10	27	25	25	27	28	29	29
5	24	23	22	24	24	25	24
4	23	22	21	22	23	23	22
3	21	21	21	21	22	23	21
2	20	20	20	20	21	22	20
1	18	17	18	16	19	20	18

Table 17. Percentile rank equivalents of raw scores for girls aged 12-17 on the person drawing as scored on the Goodenough-Harris man scale, by age: United States, 1966-70

Percentile	Age in years						
	12-17	12	13	14	15	16	17
	Raw score						
99	55	56	50	55	56	52	56
98	52	47	50	51	56	52	53
97	51	47	49	50	53	51	53
96	50	47	47	49	52	50	52
95	50	46	47	48	51	50	51
90	47	44	45	46	48	48	50
85	45	42	43	46	46	46	48
80	44	41	43	44	46	44	46
75	43	39	40	43	45	44	44
70	42	37	39	42	44	42	42
65	41	37	38	41	42	42	41
60	39	36	37	39	41	41	41
55	38	35	37	38	40	39	40
50	37	35	36	37	38	38	39
45	36	34	35	36	37	38	38
40	35	34	34	35	36	37	37
35	34	33	34	34	35	36	36
30	34	33	33	33	33	35	34
25	33	31	33	32	33	34	33
20	31	28	31	31	32	33	31
15	30	28	28	30	31	31	30
10	28	27	27	28	30	29	26
5	25	22	24	27	28	25	23
4	24	21	24	27	26	24	23
3	23	20	19	25	25	22	22
2	20	20	18	24	25	20	20
1	19	16	9	21	24	19	20

Table 18. Percentile rank equivalents of raw scores for both sexes combined aged 12-17 on the person drawing as scored on the Goodenough-Harris man scale, by age: United States, 1966-70

Percentile	Age in years						
	12-17	12	13	14	15	16	17
	Raw score						
99	55	53	52	55	56	56	55
98	53	50	50	54	55	55	54
97	52	50	49	52	54	52	52
96	51	48	48	51	53	52	52
95	50	47	48	50	51	52	51
90	47	44	45	47	48	49	49
85	45	42	44	46	46	47	47
80	44	40	43	44	44	45	46
75	43	39	41	43	43	44	45
70	41	38	40	42	42	43	43
65	40	37	39	41	41	42	42
60	39	36	37	40	40	41	41
55	38	35	36	39	39	40	40
50	37	34	36	38	38	39	39
45	36	33	35	37	37	38	38
40	35	32	34	36	36	37	37
35	34	32	33	35	35	36	36
30	33	31	32	33	34	35	35
25	32	30	30	32	33	34	34
20	31	28	29	31	31	32	33
15	29	27	27	30	30	31	31
10	27	26	26	28	28	29	28
5	24	23	23	24	25	25	23
4	23	22	22	24	24	24	23
3	22	21	20	21	23	23	21
2	20	20	20	20	22	21	20
1	18	17	18	18	19	19	18

Table 19. Percentile rank equivalents of raw scores for boys aged 12-17 on the person drawing as scored on the Goodenough-Harris woman scale, by age: United States, 1966-70

Percentile	Age in years						
	12-17	12	13	14	15	16	17
	Raw score						
99	50	49	51	54	60	51	50
98	49	47	46	50	49	50	48
97	49	46	45	50	49	50	48
96	47	46	45	50	48	49	47
95	47	45	44	49	48	47	47
90	44	42	41	46	47	44	44
85	42	40	40	42	43	43	44
80	41	38	39	41	41	43	43
75	40	37	39	40	41	41	41
70	39	37	37	38	40	40	40
65	38	36	36	38	38	40	39
60	37	35	35	37	37	39	38
55	36	34	33	36	37	38	37
50	35	33	31	34	37	37	36
45	34	32	31	33	36	36	35
40	33	32	29	33	35	35	34
35	31	30	28	32	35	33	33
30	30	29	27	31	33	32	31
25	29	29	27	29	32	29	30
20	28	28	25	28	30	28	29
15	26	26	25	27	28	26	28
10	25	24	23	23	25	25	26
5	23	23	18	17	24	24	24
4	23	23	18	17	24	24	24
3	20	21	18	17	23	24	23
2	19	20	18	15	23	23	23
1	17	20	17	5	23	20	23

drawing as scored on the Goodenough-Harris woman scale, by age: United States, 1966-70

Percentile	Age in years						
	12-17	12	13	14	15	16	17
	Raw score						
99	56	53	55	59	55	57	59
98	54	50	54	56	53	55	55
97	53	49	53	54	52	53	54
96	51	48	51	53	52	53	52
95	51	47	50	52	51	51	51
90	48	45	48	48	47	49	48
85	46	44	46	47	46	47	46
80	45	43	45	45	45	46	46
75	44	42	43	44	44	45	44
70	43	41	42	43	43	44	43
65	42	40	41	42	42	42	42
60	41	39	40	41	42	41	41
55	40	38	39	41	41	40	41
50	39	37	38	40	40	39	40
45	38	36	37	39	39	39	39
40	37	35	36	38	38	38	38
35	36	34	35	37	37	37	38
30	35	33	34	36	36	36	37
25	34	32	33	35	35	34	35
20	33	31	32	34	34	33	35
15	31	30	30	32	33	31	33
10	29	28	29	30	31	29	31
5	26	26	24	28	28	26	28
4	25	25	22	27	27	25	27
3	24	23	22	25	25	25	26
2	22	22	20	24	22	22	21
1	20	22	20	21	20	18	17

Table 21. Percentile rank equivalents of raw scores for both sexes combined aged 12-17 on the person drawing as scored on the Goodenough-Harris woman scale, by age: United States, 1966-70

Percentile	Age in years						
	12-17	12	13	14	15	16	17
	Raw score						
99	56	52	55	58	55	57	56
98	54	50	53	55	53	55	55
97	52	49	51	54	52	53	54
96	51	48	51	53	52	52	51
95	50	47	50	51	51	51	50
90	47	45	47	48	47	48	47
85	46	44	45	46	46	47	46
80	44	43	44	45	45	46	45
75	43	42	43	43	44	44	44
70	42	41	41	43	43	43	43
65	41	39	41	42	42	42	42
60	40	38	40	41	41	41	41
55	39	37	39	40	40	40	40
50	39	37	38	39	39	39	40
45	38	36	37	38	38	38	39
40	37	34	36	38	37	37	38
35	36	34	35	36	37	36	37
30	34	33	34	36	36	35	36
25	33	32	32	34	35	34	35
20	32	31	31	33	33	32	34
15	30	29	29	31	33	30	31
10	28	28	27	29	30	28	30
5	25	25	23	27	27	25	27
4	24	24	22	25	26	25	26
3	23	23	21	24	24	24	24
2	22	22	20	21	22	22	23
1	19	20	18	19	20	18	19

Table 22. Percentile rank equivalents of raw scores for boys aged 12-17 on the self drawing as scored on the Goodenough-Harris man scale, by age: United States, 1966-70

Percentile	Age in years						
	12-17	12	13	14	15	16	17
	Raw score						
99	54	51	53	52	55	58	53
98	52	49	51	51	53	54	52
97	51	48	49	50	52	53	51
96	50	47	48	50	51	52	50
95	49	46	47	49	50	51	50
90	47	43	45	46	47	48	47
85	45	42	43	45	45	46	46
80	43	40	42	44	44	44	45
75	42	39	40	43	43	43	44
70	41	37	39	42	42	42	42
65	40	36	38	41	41	41	42
60	39	36	37	39	40	41	41
55	38	35	36	38	39	40	40
50	37	34	35	38	38	39	39
45	36	33	34	37	37	37	38
40	35	33	33	36	36	36	37
35	34	31	32	35	35	35	36
30	33	30	31	33	33	34	35
25	31	30	30	32	32	33	34
20	30	29	29	31	31	32	32
15	29	27	27	29	30	30	30
10	27	25	25	27	28	28	28
5	23	23	23	23	25	24	24
4	23	22	22	22	24	23	23
3	21	21	21	21	22	22	21
2	20	20	19	19	20	21	20
1	17	17	16	17	18	19	18

Table 23. Percentile rank equivalents of raw scores for girls aged 12-17 on the self drawing as scored on the Goodenough-Harris woman scale, by age: United States, 1966-70

Percentile	Age in years						
	12-17	12	13	14	15	16	17
	Raw score						
99	56	52	55	53	55	57	57
98	53	48	53	52	50	55	54
97	51	47	51	51	50	54	53
96	50	47	50	51	50	53	52
95	50	46	48	50	49	52	50
90	46	44	46	48	47	48	47
85	45	42	44	46	46	46	46
80	43	41	43	44	44	45	44
75	42	40	42	43	43	44	43
70	42	39	41	42	42	42	42
65	41	38	40	42	42	41	41
60	40	38	39	41	41	40	40
55	39	37	38	40	40	40	40
50	38	36	37	39	39	39	39
45	37	35	36	38	38	38	38
40	36	34	35	37	37	37	37
35	35	34	34	36	37	36	37
30	35	33	34	35	35	35	36
25	34	32	33	34	34	34	35
20	32	31	31	32	34	33	34
15	31	30	30	31	32	32	32
10	29	28	28	29	30	30	30
5	26	25	23	27	27	27	26
4	25	24	23	26	26	26	25
3	23	23	22	24	25	24	23
2	22	21	21	22	24	23	21
1	19	20	19	19	19	21	14

APPENDIX I

TECHNICAL NOTES

The Survey Design

The sample design for each of the first three programs of the Health Examination Survey (Cycles I-III) has been essentially similar in that it has been a multistage, stratified probability sample of clusters of households in land-based segments. The successive elements for the sample design for Cycle III are primary sampling unit (PSU), census enumeration district (ED), segment (a cluster of households), household, eligible youth, and finally, the sample youth.

The 40 sample areas and the segments utilized in the design of Cycle III were the same as those in Cycle II. Previous reports describe in detail the sample design used for Cycle II and in addition discuss the problems and considerations given to other types of sampling frames and whether or not to control the selection of siblings.[1, 21]

Requirements and limitations placed on the design for Cycle III, similar to those for the design in Cycle II, were that:

> The target population be defined as the civilian, noninstitutionalized population of the United States, including Alaska and Hawaii, in the age range of 12-17 years with the special exclusion of children residing on reservation lands of the American Indians. The latter exclusion was adopted as a result of operational problems encountered on these lands in Cycle I.
>
> The time period of data collection be limited to about 3 years and the individual examination within the specially constructed mobile examination center be between 2 and 3 hours.
>
> Ancillary data be collected on specially designed household, medical history, and school questionnaires and from birth certificate copies.
>
> Examination objectives be related primarily to factors of physical and intellectual growth and development.
>
> The sample be sufficiently large to yield reliable findings within broad geographic regions and population density groups as well as age, sex, and limited socioeconomic groups for the total sample.

The sample was drawn jointly with the U.S. Bureau of the Census beginning with the 1960 decennial census list of addresses and the nearly 1,900 primary sampling units into which the entire United States was divided. Each PSU is either a standard metropolitan statistical area (SMSA), a county, or a group of two or three contiguous counties. These PSU's were grouped into 40 strata so that each stratum had an average size of about 4.5 million persons. Grouping was also done to maximize the degree of homogeneity within strata with regard to the population size of the PSU's, degree of urbanization, geographic proximity, and degree of industrialization. The 40 strata were then classified into four broad geographic regions of 10 strata each and then, within each region, cross-classified by four population density classes and classes of rate of population change from 1950 to 1960. Using a modified Goodman-Kish controlled-selection technique, one PSU was drawn from each of the 40 strata.

Generally, within each PSU, 20 census enumeration districts were selected, with the probability of selection of a particular ED proportional to its population in the age group 5-9 years in the 1960 census, which by 1966 approximated the target population for Cycle III. A similar method was used for selecting one segment (a smaller cluster of households) in each ED. Because of the approximately 3-year interval between Cycle II and Cycle III, the Cycle III sampling frame was updated for new construction and to compensate for segments where housing was partially or totally demolished to make room for highway construction or urban redevelopment. Each of the resulting 20 segments within a PSU was either a bounded area or a cluster of households (or addresses). All youths in the appropriate age range who resided at the address visited were eligible youths, i.e., eligible for inclusion in the sample. Operational considerations made it necessary to reduce the number of prospective examinees at any one location to a maximum of 200. When the number of eligible youths in a particular location exceeded this number, the excess eligible youths were deleted from the sample through a systematic sampling technique. Youths who were not selected as sample youths in the Cycle III sample but who were previously examined in Cycle II were scheduled for examination when time permitted and will be included in special longitudinal analyses. In

addition, individual twins who were deleted from the Cycle III sample were also scheduled for examination, as they were in Cycle II, to provide data on pairs of twins for future analysis. These data are not included in this report as part of the national probability sample of youths.

The sample was selected in Cycle III, as it had been for the children in Cycle II, to contain proportional representation of youths from families having only one eligible youth, two eligible youths, and so on, so as to be representative of the total target population. However, since households were one of the elements in the sample frame, the number of related youths in the resulting sample is greater than that which would come from a design which sampled youths 12-17 years without regard to household. The resulting estimated mean measurements or rates should be unbiased, but their sampling variability will be somewhat greater than those from a more costly, time-consuming systematic sample design in which every 4th youth would be selected.

The total probability sample for Cycle III included 7,514 youths representative of the approximately 22.7 million noninstitutionalized United States youths of 12-17 years. The sample contained approximately 1,000 youths in each single year of age who were drawn from 25 different States.

The response rate in Cycle III was 90 percent, with 6,768 youths examined out of the total sample. These examinees were closely representative of those in the population from which the sample was drawn with respect to age, sex, race, geographic region, and population density and growth in area of residence. Hence it appears unlikely that nonresponse could bias the findings appreciably.

Table I. Mean scores and standard deviations (SD) obtained by two independent scores for youths 12-17 years of age and interscorer reliability coefficients, by type of drawing, age, and sex: Health Examination Survey, 1966-70

Type of drawing, age, and sex	Number of cases	Scorer 1		Scorer 2		Interscorer reliability coefficient[1]
		Mean	SD	Mean	SD	
Person drawing						
12-17 years	6,360	37.6	7.99	38.1	8.23	0.885
12 years	1,118	35.4	7.52	35.8	7.71	0.889
13 years	1,126	36.5	7.95	36.9	8.07	0.889
14 years	1,134	38.0	8.01	38.5	8.35	0.883
15 years	1,051	38.4	7.74	38.9	8.03	0.864
16 years	1,042	38.8	8.18	39.2	8.40	0.883
17 years	889	38.8	7.98	39.5	8.15	0.885
Man figure:						
Boys	2,954	37.1	8.20	37.4	8.47	0.890
Girls	733	37.5	7.72	37.8	7.85	0.872
Woman figure:						
Boys	370	34.6	7.45	35.4	8.24	0.897
Girls	2,303	38.7	7.71	39.3	7.83	0.873
Self drawing						
12-17 years	6,357	37.3	7.74	37.7	7.95	0.881
12 years	1,124	35.0	7.20	35.3	7.29	0.878
13 years	1,130	36.2	7.66	36.4	7.94	0.884
14 years	1,129	37.6	7.87	38.1	7.97	0.883
15 years	1,052	38.1	7.58	38.7	7.69	0.868
16 years	1,026	38.7	7.70	39.1	8.10	0.874
17 years	896	38.5	7.80	39.0	7.95	0.874
Man figure—boys	3,333	36.7	8.06	37.0	8.19	0.884
Woman figure—girls	3,024	37.9	7.34	38.5	7.60	0.875

[1]Correlation between scores given by scorer 1 and scorer 2.

Reliability

While measurement processes in the surveys were carefully standardized and closely controlled, the correspondence between true population figures and survey results cannot be expected to be exact. Survey data are imperfect for three major reasons: (1) results are subject to sampling error, (2) the actual conduct of a survey never agrees perfectly with the design, and (3) the measurement processes themselves are inexact even though standardized and controlled.

General methods used to control the quality of the data from this survey have been discussed previously,[2] and some remarks relating specifically to the human figure drawing test can be found in the text of this report. As indicated, quality control methods included two independent scorings of each drawing by two adults who were carefully trained in the Goodenough-Harris scoring methods. The high level of agreement realized may be seen in table I, which shows by age and by type of drawing the average scores obtained by each scorer and the correlation between the two sets of scores.

An additional exploration of consistency in scoring on the Goodenough-Harris scales was undertaken during the Cycle III program. One hundred and forty man drawings and 84 woman drawings selected from 11 of the first 19 sampling areas were rescored under the direct supervision of Dale Harris, author of the Goddenough-Harris Drawing Test scoring standards. These 224 drawings fell into three groups representing different teams of scorers used in the Health Examination Survey study. Two persons rescored the tests independently. Any differences between the scoring were reconciled in conference before a score was reported.

Table II. Comparison of scoring of 224 drawings on the Goodenough-Harris scales by two different scoring teams

Scale and scoring team	Number of tests	Mean score	Standard deviation	Correlation between means
Man scale				
Harris' scoring team	140	41.13	9.67	r=.90
HES scoring team	140	38.14	8.73	
Woman scale				
Harris' scoring team	84	44.04	8.13	r=.89
HES scoring team	84	40.89	7.27	

These scores were correlated with the survey scores, and results appear in table II. This is additional evidence of interscorer consistency—one criterion of test reliability. The conservative tendency of scoring in the survey is supported by the 3-point mean differential between the two teams and, as is discussed in the text, may be a contributing factor to the norms derived from these data being generally lower than those from the original standardization data.

Data recorded for each sample youth are inflated in the estimation process to characterize the larger universe of which the sample youth is representative. The weights used in this inflation process are a product of the reciprocal of the probability of selecting the youth, an adjustment for nonresponse cases, and a poststratified ratio adjustment that increases precision by bringing survey results into closer alignment with known U.S. population figures by color and sex within single years of age 12-17.

In the third cycle of the Health Examination Survey (as for the children in Cycle II) the sample was the result of three principal stages of selection—the single PSU from each stratum, the 20 segments from each sample PSU, and the sample youth from the eligible persons. The probability of selecting an individual youth is the product of the probability of selection at each stage.

Because the strata are roughly equal in population size and a nearly equal number of sample youths were examined in each of the sample PSU's, the sample design is essentially self-weighting with respect to the target population, that is, each youth 12-17 years of age had about the same probability of being drawn into the sample.

The adjustment upward for nonresponse is intended to minimize the impact of nonresponse on final estimates by imputing to nonrespondents the characteristics of "similar" respondents. Similar respondents in a sample PSU are defined here as examined youths of the same age in years and sex as youths not examined in that sample PSU.

The poststratified ratio adjustment used in the third cycle achieved most of the gains in precision that would have been attained if the sample had been drawn from a population stratified by age, color, and sex. This adjustment made the final sample estimates of population agree exactly with independent controls prepared by the U.S. Bureau of the Census for the noninstitutionalized population of March 9, 1968 (approximated midpoint of the survey for Cycle III) by color and sex for each single year of age 12-17. The weight of every responding sample youth in each of the 24 age, color, and sex classes is adjusted upward or downward so that the weighted total within the class equals the independent population control. Final sample frequencies and estimated population frequencies as of the approximate midpoint of the survey are presented in table III by age and sex.

Table III. Number of youths in Cycle III HES sample, 1966-70, and estimated number of youths 12-17 years of age in the noninstitutionalized population of the United States, March 9, 1968

Age	Number of youths in sample			Estimated number of youths in population in thousands		
	Both sexes	Boys	Girls	Both sexes	Boys	Girls
12-17 years	6,768	3,545	3,223	22,692	11,489	11,203
12 years	1,190	643	547	4,002	2,032	1,970
13 years	1,208	626	582	3,952	2,006	1,946
14 years	1,204	618	586	3,852	1,951	1,901
15 years	1,116	613	503	3,751	1,900	1,851
16 years	1,092	556	536	3,625	1,836	1,789
17 years	958	489	469	3,510	1,764	1,746

Missing Test Results and Imputation Procedures

In addition to youths who were selected for the sample but not examined, there were some whose examination was incomplete in one procedure or another. The extent of missing human figure drawings is shown in table IV according to age and sex of the youth and type of drawing. Of the total 6,768 youths examined, 536 had either the person drawing, the self drawing, or both drawings missing or not adequately completed for scoring. Of these 536 cases, 504 were determined to be incomplete because of factors not directly attributable to the sample youth such as inadequate time for completion of drawing, records lost in shipping, and examiner's errors in administration. Only 32 cases were determined to be incomplete because of some characteristic of the youth being examined such as atypical behavior, sensory-motor defects, or language problems. Since the reason for incomplete test results in most cases was not directly related to the characteristic being measured, raw scores were imputed for almost all of these examinees. In the 32 cases where some problem of the youth was documented, imputation was not considered appropriate.

Imputation was accomplished in the following manner: An intercorrelation matrix of all psychological test data and selected socioeconomic variables was derived to identify those variables which were most highly associated with each raw test score. As a result, five variables were chosen for the imputation of Good-enough-Harris raw scores—other available test scores, educational level of the head of the household (four categories), age, and two control variables, race and sex. Imputation of a missing test result for an examinee was accomplished by randomly selecting a match among the group of examinees of the same age in years, parental level of education (four categories), race, sex, and available raw score test results most highly cor-

Table IV. Number of examinees aged 12-17 with no drawing or unusable human figure drawings, by type of drawing, age, and sex: Health Examination Survey, 1966-70

Age and type of drawing	All examinees	Boys	Girls
	Number		
Person drawing			
12-17 years	125	66	59
12 years	21	13	8
13 years	19	12	7
14 years	27	16	11
15 years	27	13	14
16 years	10	5	5
17 years	21	7	14
Self drawing			
12-17 years	128	57	71
12 years	15	6	9
13 years	15	8	7
14 years	32	12	20
15 years	26	5	21
16 years	26	18	8
17 years	14	8	6
Both drawings			
12-17 years	283	155	128
12 years	51	38	13
13 years	63	33	30
14 years	43	26	17
15 years	38	22	16
16 years	40	14	26
17 years	48	22	26

Table V. Number of examinees aged 12-17, by type of drawing, age, and sex: Health Examination Survey, 1966-70[1]

Age	All examinees	Boys				Girls			
		Total	Man	Woman	None[1]	Total	Man	Woman	None[1]
	Number								
Person drawing									
12-17 years	6,768	3,545	3,139	393	13	3,223	781	2,433	9
12 years	1,190	643	569	72	2	547	88	459	0
13 years	1,208	626	554	68	4	582	116	465	1
14 years	1,204	618	546	69	3	586	135	449	2
15 years	1,116	613	563	49	1	503	129	373	1
16 years	1,092	556	486	70	0	536	153	381	2
17 years	958	489	421	65	3	469	160	306	3
Self drawing									
12 years	1,190	643	637	...	6	547	...	547	0
13 years	1,208	626	623	...	3	582	...	581	1
14 years	1,204	618	614	...	4	586	...	584	2
15 years	1,116	613	612	...	1	503	...	501	2
16 years	1,092	556	556	...	0	536	...	534	2
17 years	958	489	485	...	4	469	...	465	4

[1]Includes estimated data shown in table IV.

related with the scores to be imputed. The raw score of this "matched" examinee was then imputed to the examinee with the missing score. When data for any of these variables were not available, a match was selected using information on the variables available in the youth's record. The final sample, after imputation of missing data, is displayed in table V by age, sex, and type of figure drawn by the youth.

Sampling and Measurement Error

In the present report, reference has been made to efforts to minimize bias and variability of measurement techniques. The probability design of the survey makes possible the calculation of sampling errors. The sampling error is used here to determine how imprecise the survey test results may be because they result from a sample rather than from the measurements of all elements in the universe.

The estimation of sampling errors for a study of the type of the Health Examination Survey is difficult for at least three reasons: (1) measurement error and "pure" sampling error are confounded in the data, and it is difficult to find a procedure that will either completely include both or treat one or the other separately, (2) the survey design and estimation procedure are complex and accordingly require computationally involved techniques for the calculation of variances, and (3) thousands of statistics are derived from the survey, many for subclasses of the population for which there are a small number of cases. Estimates of sampling error are obtained from the sample data and are themselves subject to sampling error which may be large when the number of cases in a cell is small or, occasionally, even when the number of cases is substantial.

Estimates of approximate sampling variability for selected statistics used in this report are presented in table VI. These estimates, called standard errors, have been prepared by a replication technique which yields overall variability through observation of variability among random subsamples of the total sample. The method reflects both "pure" sampling variance and a part of the measurement variance and is described in previously published reports.[22, 23]

Hypothesis Testing

In accordance with usual practice, the interval estimate for any statistic may be considered the range within one standard error of the tabulated statistic with 68-percent confidence or the range within two standard errors of the tabulated statistic with 95-percent confidence. The latter is used as the level of significance in this report.

An approximation of the standard error of a difference $d = x - y$ of two statistics x and y is given by the formula $s_d = \left(s_x^2 + s_y^2\right)^{\frac{1}{2}}$ where s_x and s_y are the sampling errors, respectively, of x and y. Of course, where the two groups or measures are positively or negatively correlated, this will give an overestimate or underestimate of the actual standard error.

Table VI. Standard errors for means of raw and standard scores on the Goodenough-Harris Drawing Test for youths 12-17 years of age, by sex, age, and type of drawing: United States, 1966-70

Type of drawing, scale, and age	Raw score		Standard score	
	Boys	Girls	Boys	Girls
	Standard error			
PERSON DRAWING				
Man scale				
12-17 years	0.22	0.47	0.41	0.90
12 years	0.30	0.66	0.61	1.37
13 years	0.28	0.42	0.55	0.89
14 years	0.48	0.86	0.90	1.76
15 years	0.48	0.76	0.89	1.54
16 years	0.54	0.78	1.02	1.55
17 years	0.35	0.88	0.65	1.72
Woman scale				
12-17 years	0.48	0.29	0.96	0.59
12 years	0.64	0.39	1.37	0.80
13 years	0.99	0.47	1.94	0.96
14 years	1.31	0.52	2.52	1.06
15 years	0.86	0.41	1.70	0.82
16 years	1.12	0.46	2.35	0.92
17 years	0.90	0.44	1.89	0.89
SELF DRAWING				
12-17 years	0.21	0.24	0.41	0.57
12 years	0.35	0.31	0.68	0.68
13 years	0.33	0.35	0.67	0.75
14 years	0.46	0.50	0.87	1.16
15 years	0.37	0.32	0.70	0.63
16 years	0.39	0.40	0.77	0.83
17 years	0.38	0.47	0.70	1.05

Thus, in this report, the procedure used for testing the significance of difference between means was to divide the difference between the two means by the standard error of the difference as computed above. If the magnitude of t was greater than 2.00, the difference was considered significant at approximately the 5-percent confidence level. For example, the mean raw score for 12-year-old boys on the woman drawing was 33.3, while the mean for 12-year-old girls was 36.9, a difference of 3.6 points. The approximate standard error of the difference between means was .75. Since the difference between means was almost five times the standard error, the difference was considered significant beyond the 5-percent confidence level.

Small Categories

In some tables, averages may be shown for cells for which the sample size is so small that the relative standard error may be larger than the statistic itself. Such statistics are included in this report along with their corresponding standard errors in the belief that the information, while not meeting strict standards of precision, may lend an overall impression of the survey findings and may be of interest to subject matter specialists.

Standard Scores

The following formula was used for computing the standard scores (SS) shown in this report:

$$SS_i = \frac{1}{s_{x_i}} (15)(x - \bar{x}_i) + 100.$$

In tables 7-14 for the drawings indicated, s_{x_i} is the standard deviation of the raw scores in the ith year of age, x_i is the arithmetic average or mean raw score in that age interval (both s_{x_i} and $\bar{x}_i$ derived from the inflated sample), and x is the raw score for which the standard score is being derived. When constructing these conversion tables, some smoothing of the SS corresponding to the extremely low and extremely high raw scores was necessary so that no person would receive a higher SS than a person younger than himself for an equivalent raw score. The small number of such cases was assumed to be a result of sampling error.

APPENDIX II

CYCLE III DRAWING TEST INSTRUCTIONS

GOODENOUGH – HARRIS DRAWING TEST

The following directions are given:

I WANT YOU TO DRAW A PICTURE OF A PERSON. MAKE THE VERY BEST PICTURE YOU CAN. BE SURE TO MAKE THE WHOLE PERSON, NOT JUST THE HEAD AND SHOULDERS. YOU WILL HAVE FIVE MINUTES TO DRAW A PERSON. WORK VERY CAREFULLY.

At 3 minutes, say:

YOU HAVE ABOUT 2 MINUTES.

At 5 minutes, if the examinee is not finished say

ARE YOU ALMOST FINISHED?

If the S says yes and appears to be nearly finished, allow a maximum of 2 more minutes. If the S is far from being finished, (head or trunk only completed), stop at the five-minute limit and start the Self directions.

If the S asks if he should draw a man or woman, a big or little person, a real or imaginary person, or make some other inquiry indicating a need for assurance or direction, provide a neutral statement such as USE YOUR OWN JUDGEMENT, or MAKE IT ANY WAY YOU WISH.

Turn the test form over and, say:

NOW, DRAW A PICTURE OF YOURSELF. MAKE THE VERY BEST PICTURE YOU CAN. BE SURE TO MAKE YOUR WHOLE SELF – NOT JUST YOUR HEAD AND SHOULDERS. YOU WILL HAVE FIVE MINUTES TO DRAW YOURSELF.

If the first drawing wasn't completed in 5 minutes, say:

SEE IF YOU CAN FINISH THIS DRAWING IN 5 MINUTES!

After the S completes his self drawing, turn to the first drawing and say:

TELL ME ABOUT YOUR DRAWING.

Record responses in the bottom right hand corner of the drawing space.

If there are unusal details of clothing or posture, i.e. animation, and the inquiry "Tell me about your drawing" does not indicate whether the S has drawn a special category or class of person ask:

WHO IS THIS? (Repeat same inquiry for Self drawing.)

Record the response on the bottom right hand corner of the drawing space.

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